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VOLUME I. BEHAVIORAL BIOLOGY

SCIENTIFIC PUBLICATIONS OF THE
BIOSCIENCE PROGRAM DIVISION

VOLUME I BEHAVIORAL BIOLOGY

by

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of the

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TABLE OF CONTENTS

	<u>Page</u>
PREFACE	i
LIST OF CITATIONS	1
AUTHOR INDEX	30
PERMUTED TITLE INDEX	34
SENIOR AUTHORS AND ABBREVIATED LABORATORY ADDRESSES	72
LABORATORY ADDRESSES	76
ANALYSIS OF THE PUBLICATION SOURCES	79
ADDENDUM	93

PREFACE

This bibliography was prepared to supplement the needs of various bioscience administrators at the National Aeronautics and Space Administration for maintaining a current awareness in their respective fields. When critically analyzed, bibliographies provide meaningful insight to the state of activities for scientific endeavors by defining areas of pursuit, providing records of accomplishment, identifying scientists and laboratories engaged in various scientific activities, revealing the direction of research and the areas of gradient emphasis in addition to listing the available literature in a particular subject field. For these reasons the importance of bibliographies is being increasingly recognized by both science administrators and research scientists.

The more than 1,400 citations in the total work represent the publication efforts of the grantees and contractors of the Bioscience Program Division since it was established. Letters were sent to the principal investigators requesting a list of publications resulting from research supported by grants or contracts from this division. The citations included in this bibliography were provided in response to this letter. Only those papers appearing in the serial literature and widely distributed report literature were considered. Theses and doctoral dissertations were omitted since such research would probably be published in scientific journals at a later date.

These citations have been collated into separate volumes for each program branch. A few citations predate the establishment of the branch offices under which they appear but are included because they resulted from efforts subsequently subsumed under these program offices. The volumes are enumerated as follows: Volume I, Behavioral Biology; Volume II, Environmental Biology; Volume III, Exobiology; Volume IV, Physical Biology; Volume V and VI, Planetary Quarantine and Bioscience Communications, respectively. Because of the brevity of the latter two bibliographies, they have been combined under one cover.

Each volume is divided into a number of sections beginning with the literature citations listed chronologically and according to the authors' surname. This arrangement reveals to some extent the growth and development of research under the direction of the program administrators. To provide access to these references both an author index and permuted title index are included.

An appendix is included which lists the journals in which these scientific publications appeared. This not only assists in identifying source material but indicates the wide range of scientific pursuit encompassed by the Bioscience Program Division. It is interesting to note here that the publications have appeared in 268 scientific and technical journals.

Also in the appendix is a list of the senior authors' affiliations which, when correlated with the directory of laboratory addresses, makes communication with a senior author possible. Copies or reprints of the citations embodied herein cannot be furnished by either NASA or BSCP but may be obtained by contacting the senior authors.

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Leslie A. Kulp, Ph.D.

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AUTHOR INDEX FOR THE BEHAVIORAL BIOLOGY PROGRAM

Adey, W.R.	94,95,242,243,244,279,357, 358,363,401,410,414,415,416	Chaffey, B.	293,294,296,392
Adkins, G.	49	Chiamori, N.Y.	290
Alford, B.R.	282	Chihara, C.	141
Algazi, V.R.	17,96	Chomsky, N.	115,116
Altman, J.	97,245,246,247,248	Chorover, S.L.	148,190,241,254 255
Ames, L.	7,136	Clark, F.C.	20,87,117,118
Andrus, V.	378	Clark, L.F.	176
Arbib, M.	98	Clayton, R.J.	269
Aschoff, J.	99,100	Coats, A.C.	3,29,119,282
Augenstein, L.	18,421,424,425	Cockett, A.T.K.	120,121,122,123, 124,125,256,284, 290,366,367,368, 369,370,371,373, 388,426
Backus, A.S.N.	174,355	Cohen, S.M.	148
Baldwin, H.A.	101	Colburn, H.S.	126
Barlow, J.S.	359,360,361,362	Cole, M.	254
Batini, C.	363	Cook, G.	382
Bauer, J.	212	Cordeau, J.P.	127
Bauer, R.O.	413	Corkin, S.	128
Becker, G.M.	102	Corning, W.C.	30,129,257,372, 427
Beer, B.	19,91,103	Cox, V.C.	130,258
Behr, R.	335	Crandall, P.H.	243,323
Belleville, R.E.	20,21	Crowell, A.	424
Bennett, E.L.	22	Crystal, T.H.	131
Berlekamp, E.R.	23	Dardano, J.D.	306
Bernstein, T.	76	Das, G.D.	97,248
Bever, T.	104,140,264	Davison, P.F.	8,84,209,210
Bishop, P.O.	218	Dennis, J.B.	31,32
Blum, M.	98	Dickson, J.F.	216
Boardman, C.J.	105	Dietlein, L.F.	186
Bolles, R.C.	106,107,108,249	Diffley, M.	49
Brady, J.V.	2,5,6,10,14,24,25,26,69, 137,364,384	Dillow, P.V.	274
Brill, P.L.	293,294,296,392	Doggenweiler, C.F.	132
Broderson, A.B.	390	Dore, E.K.	373
Bromberger, S.	250,365	Dunn, G.	14
Brookhouser, P.	27,109	Durlach, N.I.	33,126,314,374
Brown, J.E.	110,111	Ebert, P.M.	259
Bruce, J.D.	28,112	Eden, M.	34,67,375
Buchwald, J.S.	251,376	Edwards, T.M.	382
Burns, S.K.	187,252,301	Eigen, M.	35
Bush, A.M.	253	Eldred, E.	376
Calvin, M.	22	Elul, R.	243
Campbell, J.F.	346	Engel, R.	267
Cannon, D.R.	120		
Caplan, B.	290		
Capranica, R.R.	113		
Cavaggioni, A.	114		

Engeli, M.	36,150,153	Hammer, C.	135,261
Ertel, R.	37	Hammer, K.C.	279
Fair, C.M.	133,134	Harner, R.	378
Falliers, C.J.	268	Hastings, W.J.	428
Ferman, R.	331	Haus, E.	43,223,270,271
Ferster, C.B.	38,39,135,260,261	Hechter, O.	12,51
Findley, J.D.	4,9,10,136,137,262	Hein, A.	273
Fingerhut, A.G.	122,370	Held, R.	156,272,273
Fodor, J.A.	104,138,139,140,141,264	Hendry, D.P.	52,157,158 159,274,275
Forney, G.D., Jr.	142	Hennie, F.C.	160,276
Frank, G.	378	Henry, J.P.	161,417
French, B.	282	Hillman, D.	150,153
French, L.A.	43,144,151	Hisen, W.	267
Frenk, S.	101,132	Hodos, W.	5,6,19,26,162,277,278, 307,384,386
Frost, J.D.	299	Holsinger, J.L.	53
Fry, F.J.	40	Hoshizaki, T.	279
Fry, W.J.	40,263	Huang, T.S.	54,163,164,165,166, 167,168,224,280,281
Gabrielian, A.	281	Hull, L.D.	118
Gaertner, R.	309	Hull, R.C.	232
Galambos, R.	41,42	Jerger, J.	282
Galicich, J.G.	43,144,151	Johnson, C.J.	169
Gallager, R.G.	145	Johnson, D.E.	373
Gantt, W.H.	75,197,398,399	Johnson, E.	378
Garcia-Sainz, M.	379	Johnson, E.A.	383
Garrett, M.	264	Jude, J.R.	27,399
Gerstein, G.L.	44	Kado, R.T.	120,121,122,123,244, 358,363,367,369,426
Geselowitz, D.B.	380	Kahn, R.E.	180
Gesteland, R.C.	391	Karten, H.J.	170,277,386
Ghata, J.	315,332	Katz, J.J.	55,56,57,171,283,387
Gold, B.	265	Katz, Y.J.	284,368
Goldiamond, I.	403	Katzman, M.T.	288
Goldstein, M.H.	114	Kazmin, M.	369,370,371,388
Graham, M.H.	299	Keating, R.F.	428
Gravem, H.	378	Keith, C.	223
Gray, P.R.	146,266	Kellaway, P.	3,172,186
Green, R.	331	Kennedy, R.S.	356
Gronemann, U.F.	45	Kiang, N.Y.S.	44,89,146,173,174, 175,176,199,285
Gross, C.G.	147,148,211	Kilmer, W.L.	58,291
Hahn, P.	382	Koella, W.P.	302
Haight, J.	129	Koerber, K.C.	285
Halas, E.S.	251	Kolers, P.A.	286,287,288,389
Halberg, F.	11,36,37,43,46,47,48,49, 77,86,93,144,149,150,151, 152,153,217,223,267,268,270, 271,315,332,378,379,381,382,383	Krieger, R.L.	418
Halkerston, I.D.K.	12	Lakatua, D.	223
Hall, F.G.	704	Lange, K.O.	20,21,390
Hall, J.L.	50,154,155	Laurence, C.L.	314
Hall, R.D.	269	Lecours, A.R.	289,345
Halle, M.	116	Lee, D.A.	290
Hamburger, C.	150,152		

Lee, H.B.	168
Lee, Y.W.	177,178
Lehninger, A.L.	179
Lettvin, J.Y.	59,76,101,320,391
Little, M.S.	61
Liu, B.	180
Liu, C.K.	120
Mc Culloch, W.S.	58,59,181,291
Mac Donald, J.S.	292
Mc Intyre, R.	196
Mahut H.	127
Malek, R.	40
Mandell, A.J.	182,183,184,293,294 295,296,322,323,392,419
Mandell, M.P.	293,294,296,392
Mark, R.G.	269
Martin, R.C.	393
Martin, W.L.	393
Marvin, S.	14
Matthew, J.	378
Matthews, G.H.	62,185,297,394,395
Matthews, T.J.	19
Maulsby, R.L.	186,298,299
Meehan, J.P.	161
Mehler, W.R.	303
Melnechuk, T.	330
Melzack, R.	187,188,252
Mendell, L.M.	63
Mendelson, J.	190
Menyuk, P.	64,65,66
Mermelstein, P.	67
Migler, B.	68,69
Mishkin, M.	319
Miyada, D.S.	124
Moore, J.W.	76
Moore, R.S.	121,125,256,284,367,368, 369,371
Morgan, R.	424
Mori, K.	413
Morowitz, H.J.	70
Morris, J.	61
Moses, J.	300
Murawski, B.J.	301
Nakamura, R.M.	122,123,124,370,426
Nauta, W.J.H.	71,302,303,304
Neff, W.F.	396,420
Nelson, D.E.	305
Nelson, W.	382
Newton, J.E.O.	75,191,197,310
Niessen, C.W.	192
Oglivie, R.D.	249

Ojemann, R.G.	72
Oppenheim, A.V.	73,193
Orme-Johnson, D.	306,307
Pankau, J.W.	40
Panofsky, H.	49
Parente, R.B.	308
Peake, W.T.	412
Perdriel, G.	332
Perez-Cruet, J.	13,14,27,74,75, 109,191,194,195,196,197, 309,310,307,398,399
Pfaff, D.W.	198
Pfeiffer, R.R.	174,199,285,311 355,400
Pickard, W.F.	59,76,312,320
Pineda, A.	401
Pittendrigh, C.S.	200,201,313 402
Pitts, G.	223,382
Pitts, W.	59
Pliskoff, S.S.	1,15,196,403
Plumlee, L.A.	310
Pooler, J.	76
Postal, P.M.	57
Quastler, H.	421,425
Rabiner, L.R.	314
Radulovacki, M.	363
Ramon-Moliner, E.	304
Red Thunder Cloud	395
Reinberg, A.	153,315,332
Rhodes, J.M.	410
Richards, A.G.	77
Richards, W.A.	316,317
Richardson, W.K.	393
Roberts, A.P.	125,256,367,371
Roberts, E.	78
Roberts, R.B.	79,80
Roberts, R.P.	369
Robertson, J.D.	202
Robinson, B.W.	318,319
Rodnick, J.	293,294,296,392
Rojas, E.	320
Rojas, J.A.	111
Rosenbaum, P.S.	404
Rosenblith, W.A.	321
Ross, G.	5
Rubin, R.T.	183,184,293,294,295 296,322,323,392,419
Rudel, R.G.	324,345
Runge, W.	382

Sachs, M.B.	81,175	Tolliner, G.	14
Savage, J.E.	203	Tong, Y.L.	383
Schetzen, M.	82,177,178,204,205,206	Tremor, J.W.	223,382
Schiller, P.H.	207,255,325,326	Tretiak, O.J.	224
Schlechte, F.R.	423	Trumble, G.H.	225
Schmitt, F.O.	83,84,208,209,210,327, 328,329,330,405,406	Trumbule, G.	278
Schmitt, O.H.	223,382	Tuma, N.	424
Schneider, G.E.	211	Twitchell, T.	226,227,228,324, 345
Schramm, S.	251		
Schuster, C.	377	Ungar, F.	37,144,151
Schwartz, M.	331		
Seaman, G.	267	Valenstein, E.S.	90,91,92,130, 229,230,258,346,408,409
Sebesta, P.D.	223,382	Valenstein, T.	92
Sekuler, R.	212	Van Pilsum, J.F.	93
Sheff, R.	293,294,296,392	Van Toller, C.	52,159
Sherman, J.A.	222	Van Trees, H.L.	105,231,347,348
Shiple, J.W.	146	Van Zytveld, J.	18
Siebert, W.M.	213	Vaughan, E.G.	232
Siffre, M.	153,315,332		
Silverstein, A.M.	16	Walk, R.D.	349,350,351
Simon, W.	214	Wall, P.D.	63,188,233
Sklar, J.R.	85	Walsh, J.T.	127
Sling, R.	332	Walter, D.O.	244,410
Smith, D.	382	Walter, R.D.	243
Smith, M.C.	207,326	Warr, W.B.	174,285
Snyder, D.L.	215	Wasserman, G.S.	352
Spooner, C.E.	333,413	Watanabe, T.	176
Squire, L.R.	334	Weber, M.L.	230
Stark, L.	216	Weiss, P.A.	234
Stein, J.J.	370	Weiss, T.F.	411
Stein, M.	49	Weksel, W.	104
Stephens, G.	217	Wickelgren, W.	102,235,236,237, 238,239,240,353,354
Stephens, G.C.	86	Wiederhold, M.L.	412
Stephens, G.J.	86	Wiener, F.M.	355
Stephens, P.	161,417	Winters, W.D.	333,413
Stickney, R.E.	428	Wozencraft, J.M.	356
Stokes, L.W.	108	Wyke, M.	241
Streeter, J.	423		
Strumwasser, F.	335,422,423	Yamamoto, S.	428
Stubbs, A.	336,344,407	Yarczower, M.	275
Swank, R.	267	Yeagers, M.	424
Swanson, L.E.	388		
Switalski, D.	275		
		Zimmerman, J.	377
Takata, M.	76		
Taplin, G.V.	373		
Tapp, J.W.	87		
Taub, A.	88,218		
Teas, D.C.	89		
Teuber, H.-L.	219,220,221,324,337,338, 339,340,341,342,345		
Thomas, E.C.	176		
Thomas, J.R.	222,336,343,344,407		

PERMUTED TITLE INDEX

ablation on a circadian pituitary adrenocorticotrophic rhythm in C mice/E	144
ablations/Auditory discriminations affected by cortical	396
abnormalities in motor development/Variations and	228
acceleration/On the behavior of small animals under the space flight con	21
accelerative conditions found in space travel/The behavior of small anim	20
accessory superior-olivary nucleus of the cat/Binaural interaction in th	154
accuracy attainable in the estimation of continuous random processes/Bou	348
Acentral probability generating station/	157
Acoustic similarity and intrusion errors in short-term memory/	235
acoustic stimuli from single units in the eighth nerve of the green frog	81
acoustic stimuli on spontaneous spike discharges in auditory nerve fiber	175
acoustic stimulus parameters/Efferent inhibition of auditory nerve respo	412
(acoustics)Binaural interaction in the accessory superior-olivary nucleu	154
(acoustics)Classification of response patterns of spike discharges for u	311
(acoustics)Minimum detectable change in interaural time or intensity dif	50
(acoustics)Note on binaural masking-level differences at high frequencie	33
(acoustics)Stimulus coding in the auditory nerve and cochlear nucleus/	173
(acoustics)Time-intensity relations in binaural unmasking/	126
(acoustics)Auditory discriminations affected by cortical ablations/	396
acquisition for the normative electroencephalographic reference library/	172
acquisition of syntax: a critique of "contextual generalization"/On the	104
ACTH induced increase in tryptophan turnover along induceable pathways i	295
active use of grammar in speech perception/The	264
activity cycle/Effects of adiurnal lighting and feeding on the rat's diu	249
activity in chronic cats/Relationships of neuronal spike populations and	251
activity in mouse kidney - an aspect of circadian periodic enzyme activi	93
activity in the cochlear nucleus of anesthetized cats/Spike discharge p	199
activity in the diagnosis of urologic neoplasms/Urinary LDH (Lactic Dehy	290
activity/Rat retinal ganglion cells: receptive field organization and m	111
activity, rectal temperature and pinna mitosis of starving, dehydrated	151
activity/Transamidinase activity in mouse kidney - an aspect of circadia	93
adaptation level and metacontrast/Photoreceptor latency	317
a-diurnal feeding/Rat's anticipation of diurnal and	108
a-diurnal lighting and feeding on the rat's diurnal activity cycle/Effec	249
adrenal axis during rapid eye movement sleep in man/Activation of the pi	296
adrenal axis in man/Rhinencephalic regulation of the pituitary	419
adrenal corticosteroids, sleep deprivation and the EEG in normal men/Cir	378

adrenal steroids and alpha frequency in the EEG: A demonstration/Daily	301
adrenal venous effluent of dogs/Variance spectra of corticosteroid in	43
Adrenocortical function in pathological emotional states/	322
adrenocorticotrophic activity, rectal temperature and pinna mitosis of s	151
adrenocorticotrophic rhythm in C mice/Effect of cerebral ablation on a c	144
adult before, during and after her isolation under-ground for three mon	315
adult man during the two months of staying under-ground/Broad study of t	153
adult subjects before, during and after their isolation/Prolonged isolat	332
afferent fibres/Presynaptic hyperpolarization: A role for fine	63
afferent spectrum/The spinocervical tract: dorsal-column linkage, condu	218
afferent system/Local, segmental and supraspinal interaction with a dors	88
age/Arterial pressure in CBA mice as related to	161
agnosia/Some needed revisions of the classical views of	221
alimentary systems/A new model of	318
Alleviation of conditioned suppression/	159
alpha frequency in the EEG: A demonstration/Daily correlation of adrena	301
Alterations in perception after brain injury/	337
alternation and Hebb-Williams maze performance/Caudate, cortical, hippoc	148
alternation deficits produced by electrical stimulation on monkeys/Aspec	147
Alternation of rules in children's grammar/	64
alternation performance in patients with cerebral lesions/Delayed	254
altitude/Urinary bladder calculi formed in rats at	124
amnesia" in one-trial learning/A re-examination of "Prolonged retrograde	255
(amphibia)The evoked vocal response of the bullfrog/	113
amplitude in human blood/Cosinor-evaluation of circadian rhythm with low	267
Analog communication over randomly time-varying channels/	347
analysis - a potential tool for biometeorologists/Periodicity	11
analysis and memory/Cortical unit	41
analysis; longitudinal and transverse profiles of rhythms/Some aspects	149
analysis of baseline and Gemini flight GT-7 data with specification of o	244
analysis of brain wave records from Gemini flight "GT-7" and continuatio	358
analysis of complex behavioral repertoires under continuous environmenta	26
analysis of EEG tremor relationships in man/Correlation	359
analysis of electrophysiological data from auditory nerve fibers in cat/	266
analysis of neurophysiological data/Concepts of cerebral organization ar	95
analysis of psychosomatic disorders/Instrumental behavior and psychophy	25
analysis of some psychosomatic problems/Behavior stress and physiologica	24
analysis of steroid rhythms in data at equal or un-equal intervals/Spect	36
analysis of systems characterized by nonlinear differential equations/Fu	308
Analysis of the structure of English language/	424
analysis of their physiologic and pathologic responses, including injury	46
analyzing variations in evoked responses/A method for	252
androgen-induced circaseptan desynchronization/Spectral resolution of lo	150
anesthesiology/The neurophysiology of	413
angle modulation/Optimum	105
animal behavior/Organic foundations of	247
Animal behavior and mental illness/	260
Animal behavior in fields of simulated gravity/	390
animal payload and integration with a sounding rocket/Development of a s	418
animals in a multi-enclosure programmed environment/Detecting and record	9
animals in a single experimental space/A combination lock for automatic	39
animals/Matters relating to the state of sleep in	242
animals under the accelerative conditions found in space travel/The beha	20
animals under the space flight conditions of accelerations)/(On the beha	21
antibacterial levels in the renal-lymph during treatment of pyelonephrit	256
a-periodically/Consummatory behavior in rats maintained	106

aplysia/Prolonged in vitro culture and autoradiographic studies of neuron apparatus/An investigation of barley seedling growth responses to simulated apparatus/Temperature effects on the peripheral auditory application to telephone channels/Digital communication over fixed time-c applications/A simple derivation of the coding theorem and some approach and escape reactions to electrical stimulation of the brain/Inde approach to the experimental analysis of some psychosomatic problems/Beha Arithmetic behavior in chimpanzees/ arithmetic behavior/Synthesizing the components of arrest with closed chest massage of classical conditioning reflexes/The e arrest with closed chest massage on the EEG in dogs/The effect of cardiac arrhythmia during panting/Sinus arrhythmia/Systolic blood pressure changes during two beat sinus arrhythmias/Peripheral versus central mechanisms in the conditioning of e Arterial pressure in CBA mice as related to age/ arthropod preparation suitable for chronic electro-physiological, biochem asymmetry in phrase structure grammars/A note on Attenuation of aversive properties of peripheral shock by hypothalamic st Attenuation of pupil response during binocular rivalry/ Attitudinal reflexes/ auditory apparatus/Temperature effects on the peripheral auditory cortex/Evoked responses from the auditory cortex/Responses of single units in the auditory discrimination/Experimental studies of Auditory discriminations affected by cortical ablations/ auditory masking. Effect of masking intensity/Physiological observations auditory meatus of the cat/On the sound pressure transformation by the he auditory neurons/Some implications of the stochastic behavior of primary auditory nerve and cochlear nucleus/Stimulus coding in the auditory nerve/Discharge patterns of single fibers in the cat's auditory nerve fibers/Effect of acoustic stimuli on spontaneous spike dis auditory nerve fibers in cat/A statistical analysis of electrophysiologic auditory nerve fibers/Probabilities with spike discharge in auditory nerve responses: dependence on acoustic stimulus parameters/Eff auditory system/A model of the peripheral auditory threshold/Effect of very low frequency tones on automatic programming/A pulser device for automatic programming of two animals in a single experimental space/A com Autoradiographic and implantation studies of sex hormones/ Autoradiographic in histological studies of postnatal neurogenesis/ Autoradiographic examination of behaviorally induced changes in the prote autoradiographic studies of neurons in aplysia/Prolonged in vitro culture averaging data during stimulus generalization/Effects of aversive properties of peripheral shock by hypothalamic stimulation/Atten avian brain/Distribution of monoamines and regional uptake of DL-norepine avoidance behavior/Electroencephalographic correlates of temporally space avoidance behavior in the rhesus monkey/Concurrent measurement of heart r avoidance behavior under 24-hour control experiment/Second order Avoidance of a return to the first component of a chain from the terminal avoidance with the chimpanzee/A note on time out from axon/Caesium ions do not pass the membrane of the giant axon membrane/A theory of passive ion flux through axon protein/Chemical, structural, and immunological studies of nerve	335 279 119 53 145 229 24 38 261 27 109 197 75 74 161 129 62 130 316 226 119 89 44 420 396 29 355 213 173 176 175 266 146 412 411 282 7 39 198 248 245 335 68 130 333 6 14 377 343 136 76 59 84
backward masking as a function of relative overlap and intensity of test	325

backward masking/A comparison of forward and	207
(barium compound)Some dielectric and electro-optic properties of BaTiO ₃ s	169
barley seedling growth responses to simulated weightlessness induced by t	279
basal blood pressures in unanesthetized dogs using the ring-catheter tech	310
baseline and Gemini flight GT-7 data with specification of on-line comput	244
BaTiO ₃ single crystals/Some dielectric and electro-optic properties of	169
(behavior)A comparison of forward and backward masking/	207
behavior and conditioned fear/Timing	69
behavior and mental illness/Animal	260
behavior and psychophysiological change: A comparative approach to the e	25
behavior as a function of amount of reinforcement/Timing	103
behavior by stimulus change/Disruption of punished and non-punished	306
(behavior)Curiosity in the hamster/	211
behavior during interval schedules/Observing	274
behavior/Effects of deprivation conditions upon the rat's home cage	107
behavior/Electroencephalographic correlates of temporally spaced respondi	6
behavior in chimpanzees/Arithmetic	38
behavior in fields of simulated gravity/Animal	390
behavior in rats maintained a-periodically/Consummatory	106
behavior in the rhesus monkey/Concurrent measurement of heart rate and in	14
(behavior)Macromolecular conformation changes as possible information pro	18
behavior of animals in a multi-enclosure programmed environment/Detecting	9
behavior of neuronal populations during sleep and mental states/The coope	243
behavior of primary auditory neurons/Some implications of the stochastic	213
behavior of small animals under the accelerative conditions found in spac	20
behavior of small animals under the space flight conditions of accelerati	21
behavior/Organic foundations of animal	247
behavior/Programmed environments for the experimental analysis of	262
behavior/Psychophysiology of emotional	2
(behavior)Rate change effects during a pre-schedule change stimulus	1
(behavior)Rate change effects with equal potential reinforcements during	15
Behavior stress and physiological change: A comparative approach to the	24
behavior/Synthesizing the components of arithmetic	261
behavior under 24-hour control experiment/Second order avoidance	377
behavioral consequences of frontal-lobe lesions in rodents, carnivores an	341
Behavioral influences on the utilization of (³ H) leucine by the brain/	246
behavioral repertoires/An experimental outline for building and exploring	4
behavioral repertoires under continuous environmental control/Experimenta	26
behavioral study/An arthropod preparation suitable for chronic electrophy	129
behaviorally induced changes in the protein and nucleic acid metabolism o	245
bibliography/Glia	61
bibliography/Memory	133
bilateral hippocampal lesions/Tactually-guided maze learning in man: eff	128
bilingually/Reading and talking	287
binaural masking-level differences at high frequencies/Note on	33
Binaural interaction in the accessory superior-olivary nucleus of the cat	154
binaural unmasking and the EC model/Further results on	314
binaural unmasking/Time-intensity relations in	126
binocular rivalry/Attenuation of pupil response during	316
bioassay of renin/A simplified method for the extraction and	284
bioassay of renin from kidneys of sodium-depleted and sodium-loaded rats/	371
bioastronautics/Physiologic rhythms and	48
biochemical and behavioral study/An arthropod preparation suitable for ch	129
Biochemical aspects of rapid eye movement sleep/	182
bioelectric potentials in an inhomogeneous volume conductor/On	380
bioelectric signals/A simple time-division multiplexing system for low-fr	362

Biologic data analysis; longitudinal and transverse profiles of rhythms	149
biologic rhythms/Computer techniques in the study of	49
Biological clocks - the functions, ancient and modern of circadian oscill	200
biological problems to be attacked with a series of U.S. satellites in 19	201
biological systems/Chemical means of information storage and readout in	35
biology/Memory storage and low-temperature	70
biology - where do they meet?/Physics and	321
biometeorologists/Periodicity analysis - a potential tool for	11
(biophysics)On bioelectric potentials in an inhomogeneous volume	380
(biorhythm)Biological clocks - the functions, ancient and modern of circa	200
(biorhythm)Circadian rhythmic pituitary adrenocorticotrophic activity, rec	151
(biorhythm)Cosinor-evaluation of circadian rhythm with low amplitude in h	246
(biorhythm)Effects of cerebral ablation on a circadian pituitary adrenoco	144
(biorhythm)Physiological rhythms/	47
(biorhythm)Physiologic rhythms and bioastronautics/	48
(biorhythm)Rat's anticipation of diurnal and a-diurnal feeding/	108
(biorhythm)Some aspects of biologic data analysis; longitudinal and tran	149
(biorhythm)Spectral resolution of low-frequency, small-amplitude rhythms	150
(biorhythm)Variability of physiologic circadian crests in groups of child	268
(biorhythms)Electronic computer techniques for the study of endocrine rhy	152
(biorhythms)Periodicity analysis - a potential tool for biometeorologists	11
Biosatellite performance simulations/	94
(bird)A stereotaxic atlas of the brain of the pigeon/	386
(bird)Broad study of the circadian rhythm of chickens with alternating sl	153
(bird)Projections of optic tectum of the pigeon (Columba livia)/	170
bladder calculi formed in rats at altitude/Urinary	124
bladder calculogenesis/The effect of megavoltage, total body irradiation	122
bladder cancer using local bladder hyperthermia/The enhancement of region	370
blinded fiddler crab: an invertebrate model of circadian desynchronizati	86
blood/Cosinor-evaluation of circadian rhythm with low amplitude in human	246
Blood pressure and heart rate changes during sinus arrhythmia/	194
Blood pressure and heart rate changes in dogs during hypothalamic self-st	196
blood pressure changes during two beat sinus arrhythmia/Systolic	75
blood pressure in unanesthetized dogs using the ring-catheter technique	310
blood pressure response to social stress/Role of early experience in dete	417
Brain and nerve proteins: functional correlates/	209
brain-aspects of quantitative organization/Mammillary complex of cat	263
(brain)Auditory discriminations affected by cortical ablations/	396
brain/Autoradiographic examination of behaviorally induced changes in the	245
brain/Behavioral influences on the utilization of (3H) leucine by the	246
(brain)Cerebral localization and organization/	227
brain/Distribution of monoamines and regional uptake of DL-norepinephrine	333
brain function/Molecular correlates of	405
brain/Independence of approach and escape reactions to electrical stimula	229
brain injury/Alterations in perception after	337
brain injury/The lesson of focal	338
brain lesions and memory changes/Correlations between specific human	72
(brain)Minimal cerebral dysfunction in children: motor deficits/	345
brain/Molecular and ultrastructural correlates of function in neurons, ne	327
brain of the pigeon/A stereotaxic atlas of the	386
brain/Postnatal origin of microneurons in the rat	97
brain/Quantitative neuroanatomic studies implemented by ultrasonic lesion	40
(brain)Rate of intracranial self-stimulation as a function of reinforcement	19
brain stem/The isodendritic core of the	304
Brain stimulation/	384
brain stimulation/Continuous opportunity for reinforcing	91
brain stimulation/Motivational properties of long durations of rewarding	162

brain stimulation/Problems of measurement and interpretation with reinfor	90
brain stimulation/The effects of mesencephalic central grey lesions on re	258
brain stimulation/The medial forebrain bundle-lateral hypothalamic area a	346
brain structures and functions related to memory/Some	71
brain structures/Methods for completely deciphering the neuronal circuitr	143
brain that ink may character?/What's in the	181
brain tissue/Neurophysiological correlates of information transaction an	416
brain wave records from Gemini flight GT-7 and computation to be used in	358
Brightness and pattern discrimination deficits after lesions of nucleus	277
Brightness enhancement in intermittent light; variation of luminance an	352
building and exploring multi-operant behavioral repertoires/An experimen	4
bulbocapnine/Cardio-respiratory components of conditional catalepsy to	397
bullfrog/The evoked vocal response of the	113
bundle-lateral hypothalamic area and reinforcing brain stimulation/The m	346
Caesium ions do not pass the membrane of the giant axon/	76
calculi formed in rats at altitude/Urinary bladder	124
calculogenesis/The effect of megavoltage, total body irradiation on expe	122
cancer reevaluated by electronic computer programs - evidence for tempor	379
cancer using local bladder hyperthermia/The enhancement of regional blad	370
cardiac arrest with closed chest massage on classical conditioning refle	27
cardiac conditional reflexes/The cardiodynamics of	309
cardiodynamics of cardiac conditional reflexes/The	309
Cardio-respiratory components of conditional catalepsy to bulbocapnine/	397
cardiovascular and visuomotor studies relating to spatial orientation in	414
Cardiovascular responses to novel and conditional stimuli evaluated by s	191
carnivores and primates/Some behavioral consequences of frontal-lobe les	341
Carroll's "Language and Thought"/Review of	139
cat/A statistical analysis of electrophysiological data from auditory ne	266
catalepsy to bulbocapnine/Cardio-respiratory components of conditional	397
Catawba texts/	395
cat/Binaural interaction in the accessory superior-olivary nucleus of th	154
cat brain - aspects of quantitative organization/Mammillary complex of	263
cat brain/Quantitative neuroanatomic studies implemented by ultrasonic l	40
cat/Hypertonic urea: its effects on cortical and sub-cortical evoked po	401
cat/On the sound pressure transformation by the head and auditory meatus	355
(cat)Response of single dorsal cord cells to peripheral cutaneous unmyel	189
(cat)The spinocervical tract: dorsal-column linkage, conduction velocit	218
cat's auditory nerve/Discharge patterns of single fibers in the	176
cats/Relationships of neuronal spike populations and EEG activity in chr	251
cats/Spike discharge pattern of spontaneous and continuously stimulated	199
caudate, cortical, hippocampal and dorsal thalamic lesions in rats: alt	148
CBA mice as related to age/Arterial pressure in	161
cell membrane/Staining properties of lanthanum on	132
cell membranes/The role of water structures in the molecular organizatio	51
cells of the rat/Dendritic fields of retinal ganglion	110
cells: receptive field organization and maintained activity/Rat retinal	111
cells to peripheral cutaneous unmyelinated fibers/Response of single dor	189
Cellular regulatory mechanisms/	8
central grey lesions on responses to reinforcing brain stimulation/The e	258
central mechanisms in the conditioning of ectopic arrhythmias/Peripheral	74
central nervous, cardiovascular and visuomotor studies relating to spati	414
central nervous monitoring in performing subjects/Electrode problems in	385
central nervous system function/Mathematical concepts of	216
Central nervous system: motor mechanisms/	376
central nervous system/Processing and transmitting information through t	155
cerebral ablation on a circadian pituitary adrenocorticotrophic rhythm in	144

cerebral dysfunction in children: motor deficits/Minimal	345
cerebral lesions/Delayed alternation performance in patients with	254
Cerebral localization and organization/	227
cerebral organization arising from time series analysis of neurophysiolo	95
cerebral responses in man/Functional relations between stimulus intensit	232
cerebral tissue in alerting, orienting and discriminative responses/Intr	415
cerebral tissue in transaction and storage of information/The organizati	357
chain from the terminal component/Avoidance of a return to the first com	343
change: A comparative approach to the experimental analysis of some psy	24
change effects during a pre-schedule change stimulus/Rate	1
change effects with equal potential reinforcements during the "warning s	15
changes as possible information processing mechanisms/Macromolecular con	18
channel interference/Orthogonal detection to reduce common	131
channels/Analog communication over randomly time-varying	347
channels/Error bounds for parallel communication	259
channels with memory-with special application to telephone channels/Digi	53
character?/What's in the brain that ink may	181
chemical correlates of function/The synapse: morphological and	202
Chemical means of information storage and readout in biological systems/	35
Chemical, structural, and immunological studies of nerve axon protein/	84
chest massage on classical conditioning reflexes/The effect of cardiac a	27
chest massage on the EEG in dogs/The effect of cardiac arrest with close	109
chickens with alternating sleepwakefulness and of the estimation of time	153
children from preschool through first grade/Syntactic rules used by	66
children: motor deficits/Minimal cerebral dysfunction in	345
children studied "transversely"/Variability of physiologic circadian cre	268
children with functionally deviant and normal speech/Comparison of gramm	65
children's grammar/Alternation of rules in	64
chimpanzee/A note on time out from avoidance with the	136
(chimpanzee)Facilitation of large ratio performance by use of conditione	137
chimpanzee/Strategies of schedule preference in the	278
chimpanzees/Arithmetic behavior in	38
chronic basal blood pressures in unanesthetized dogs using the right-cath	310
chronic cats/Relationships of neuronal spike populations and EEG activit	251
chronic electrophysiological, biochemical and behavioral study/An arthro	129
circadian crests in groups of children studied "transversely"/Variabilit	268
circadian desynchronization/The blinded fiddler crab: an invertebrate m	86
circadian oscillation in Drosophila pseudoobscura pupae: a model for th	313
circadian oscillations/Biological clocks - the functions, ancient and mo	200
circadian periodic enzyme activity/Transamidinase activity in mouse kidn	80
circadian periodicity, adrenalcorticosteroids, sleep deprivation and th	378
Circadian phase diagrams of oral temperature and urinary functions in a	270
circadian pituitary adrenocorticotrophic rhythm in C mice/Effect of cereb	144
circadian rhythm in hepatic glycogen of mice during inanition and dehydr	271
circadian rhythm of chickens with alternating sleepwakefulness and of th	153
circadian rhythm with low amplitude in human blood/Cosinor-evaluation of	267
Circadian rhythmic pituitary adrenocorticotrophic activity, rectal temper	151
circadian rhythms for space flight/Significance of	100
Circadian rhythms in man/	99
circadian rhythms of C mice/Phase difference tests - longitudinal and tr	223
Circadian rhythms, space research and manned space flight/	402
Circadian system-phase - an aspect of temporal morphology; procedures a	383
Circadian system-phase dependent toxicity and other effects of SU-4885 i	37
circadian systems; temporal analysis of their physiologic and pathologi	46
circadian temperature rhythm in the rat kept in continuous light of 30 l	382
circaseptan desynchronization/Spectral resolution of low-frequency, smal	150
circuitry of brain structures/Methods for completely deciphering the neu	143

classical conditioning reflexes/The effect of cardiac arrest with closed	27
classical views of agnosia/Some needed revisions of the	221
classification of response patterns of spike discharges for units in the	311
clock/The circadian oscillation in <i>Drosophila pseudoobscura</i> pupae: a mo	313
clocks - the functions, ancient and modern, of circadian oscillations/Bi	200
C mice/Circadian rhythmic pituitary adrenocorticotrophic activity, rectal	151
C mice/Effect of cerebral ablation on a circadian pituitary adrenocortic	144
C mice/Phase difference tests - longitudinal and transverse - on circadi	223
cochlea/Spontaneous spike discharge from single units in the cochlear nu	285
cochlear nucleus/Stimulus coding in the auditory nerve and	173
cochlear nucleus after destruction of the cochlea/Spontaneous spike disc	285
cochlear nucleus of anesthetized cats/Spike discharge patterns of sponta	199
cochlear nucleus/Stimulus coding in the	174
cochlear nucleus: tone-burst stimulation/Classification of response patt	311
cochlear nucleus: Waveforms of extracellularly recorded spike potential	400
cockroach gauged by variance spectra/Oxygen uptake rhythms in a	77
codes/Concatenated	142
codes/Note on recurrent	23
Coding color pictures/	45
coding/Digital picture	280
coding in the cochlear nucleus/Stimulus	174
coding in neuronal memory/On the nature of macromolecular	12
coding in the auditory nerve and cochlear nucleus/Stimulus	173
coding/Modulation and demodulation for probabilistic	356
coding/On retina-cortex connections and DNA	79
coding theorem and some applications/A simple derivation of the	145
color pictures/Coding	45
(<i>Columba livia</i>)/Projections of optic tectum of the pigeon	170
coma by saccharin/The potentiation of insulin	230
Combination lock for automatic programming of two animals in a single ex	39
communication channels/Error bounds for parallel	259
communication over fixed time-continuous channels with memory - with spe	53
communication over randomly time-varying channels/Analog	347
comparative approach to the experimental analysis of psychosomatic disor	25
comparative approach to the experimental analysis of some psychosomatic	24
comparison of forward and backward masking/A	207
Comparison of grammar of children with functionally deviant and normal s	65
comparison of optimum angle modulation systems and rate-distortion bound	231
Comparison of spatial discrimination in the temporal and nasal sectors o	241
complex of cat brain - aspects of quantitative organization/Mammillary	263
component of a chain from the terminal component/Avoidance of a return t	343
components of arithmetic behavior/Synthesizing the	261
computation facility for education and research/A multiuser	32
computation problem with sequential decoding/The	203
computation to be used in a 30 day primate flight/Analysis of brain wave	358
computations/One-tape, off-line turing machine	160
computations/On-line turing machine	276
(computer)Analog communication over randomly time-varying channels/	347
(computer)Concatenated codes/	142
(computer)Distributed solution of network programming problems/	31
(computer)Note on application of the EC model to interaural JND's/	374
computer program/Word-recognition	265
computer programs - evidence for temporal pathology/Mitotic rhythms in h	379
computer recognition of connected handwritten words/Experiments on	67
(computer)Technical details of data acquisition for the normative electr	172
computer techniques for the study of endocrine rhythms/Electronic	152
Computer techniques in the study of biologic rhythms/	49

computers in temporal pathology- an analogy to microscopy/Resolving pow	381
computing requirements/Analysis of baseline and Gemini flights GT-7 data	244
Concatenated codes/	142
concepts of central nervous system function/Mathematical	216
Concepts of cerebral organization arising from time series analysis of n	95
conditional catalepsy to bulboapnine/Cardio-respiratory components of	397
conditional reflexes/The cardiodynamics of cardiac	309
conditional stimuli evaluated by successive beats/Cardiovascular respons	191
conditioned fear/Timing behavior	69
conditioned reinforcement/Facilitation of large ratio performance by use	137
conditioned reinforcing stimuli/Enhancement of fixed-ratio performance b	344
conditioned suppression/Alleviation of	159
conditioned suppression/The effect of discrimination training on general	275
conditioning of ectopic arrhythmias/Peripheral versus central mechanisms	74
conditioning reflexes/The effect of cardiac arrest with closed chest mas	27
conditioning studies/A device for the partial restraint of rats in opera	269
conditioning to paired stimuli in man/Some observations on evoked respon	360
conditioning with hypothalamic stimulation as an unconditional stimulus/	13
conferences, divergences, lacunae/Summation:	342
conflicting and inaccurate observations/Decisions based on	102
conformation changes as possible information processing mechanisms/Macro	18
congenital encephalopathy/Unusual sensory status in	324
consciousness by EEG measurements -- a study of four subjects/Discrimina	410
consonant-vowel diagrams/Similarity and intrusions in short-term memory	240
Consummatory behavior in rats maintained a-periodically/	106
"contextual generalization"/On the acquisition of syntax: a critique of	104
continuous random processes/Bounds on the accuracy attainable in the est	348
control experiment/Second order avoidance behavior under 24 hour	377
control/Experimental analysis of complex behavioral repertoires under co	26
Control of temporally spaced responding by a repetitive stimulus/	225
control of temporally spaced responding in second order schedules/Stimul	407
controversial questions in phonological theory/Some	116
cooperative behavior of neuronal populations during sleep and mental sta	243
coordination/Plasticity in sensorimotor	272
cord cells to peripheral cutaneous unmyelinated fibers/Response of singl	189
core of the brain stem/The isodendritic	304
correlates of brain function/Molecular	405
correlates of function in neurons, neuronal nets, and the brain/Molecula	327
correlates of information transaction and storage in brain tissue/Neuro	416
correlates of temporally spaced responding and avoidance behavior/Electr	6
Correlation analysis of EEG tremor relationships in man/	359
correlation functions/Measurement of	82
correlates/Brain and nerve proteins: functional	209
correlation of adrenal steroids and alpha frequency in the EEG: A demon	301
Correlations between specific human brain lesions and memory changes/	72
cortex connections and DNA coding/On retina	79
cortex/Evoked responses from the auditory	89
cortex/Responses of single units in the auditory	44
cortical ablations/Auditory discriminations affected by	396
cortical and subcortical evoked potentials in cat/Hypertonic urea; its	401
cortical excisions and bilateral hippocampal lesions/Tactually-guided ma	128
cortical, hippocampal and dorsal thalamic lesions in rats: alteration	148
Cortical unit analysis and memory/	41
corticosteroid in adrenal venous effluent of dogs/Variance spectra of	43
Corticosteroid responses to limbic stimulation in man: localization of	323
corticosteroids, sleep deprivation and the EEG in normal men/Circadian p	378

Cosinor evaluation of circadian rhythm with low amplitude in human blood	267
crab: an invertebrate model of circadian desynchronization/The blinded	86
crests in groups of children studies""transversely"/Variability of physi	268
critique of "contextual generalization"/On the acquisition of syntax: a	104
critique of Wittgenstein/Operationalism and ordinary language, a	141
cross-optic transfer of habituated responses in limulus/Test of	372
crystal/Some dielectric and electro-optic properties of BaTiO ₃ single	169
\pm C, T networks/Bounds on impedance functions of R, \pm 1,	168
culture and autoradiographic studies of neurons in aplysia/Prolonged in	335
cube/Resistance of an N-Dimensional	224
Curiosity in the hamster/	211
cutaneous afferent system/Local, segmental and supraspinal interaction w	88
cutaneous unmyelinated fibers/Response of single dorsal cord cells to pe	189
cybernetic unit: a biochemist's fantasy/The synapse as a	78
cycle/Effects of adiurnal lighting and feeding on the rat's diurnal acti	249
data acquisition for the normative electroencephalographic reference lib	172
data analysis; longitudinal and transverse profiles of rhythms/Some asp	149
data at equal or unequal intervals/Spectral analysis of steroid rhythms	36
data/Concepts of cerebral organization arising from time series analysis	95
data during stimulus generalization/Effects of averaging	68
data from auditory nerve fibers in cat/A statistical analysis of electro	266
data reference library/The normative electroencephalographic	186
data with read-in jitter/Optimum prefiltering in sampled	180
data with specification of on-line computing requirements/Analysis of ba	244
death/Organisms as circadian systems; temporal analysis of their physio	46
deciphering the neuronal circuitry of brain structures/Methods for compl	143
decision making by man. I. Limitations on transmission rate in sequent	421
decision making by man. II. Evidence of periodicity/Information on pro	425
Decisions based on conflicting and inaccurate observations/	102
decoding/An experimental facility for sequential	192
decoding/The computation problem with sequential	203
decompression sickness - dysbarism/Patho-physiology of	426
decompression sickness/Physiological factors in	123
deficits after lesions of nucleus rotundus in the pigeon/Brightness and	277
deficits produced by electrical stimulation on monkeys/Aspects of the de	147
delay in reinforcement/Variables determining the effects of	135
demodulation for probabilistic coding/Modulation and	356
demonstration of ion-exchange phenomena in phospholipid mono-molecular f	320
demyelinating diseases/Research in	42
dendrites/Impulses originating in the region of	233
Dendritic fields of retinal ganglion cells of the rat/	110
density/Rate of intracranial self-stimulation as a function of reinforce	19
density spectrum of television random noise/The power	165
dependence of degree of difficulty/Machine	98
depression/Transfer of habituation using spreading	334
deprivation conditions upon the rat's home cage behavior/Effects of	107
depth perception with the visual cliff/Studying	351
derivation of the coding theorem and some applications/A simple	145
description/An integrated theory of linguistic	57
desynchronization/Spectral resolution of low-frequency, small-amplitude	150
desynchronization/The blinded fiddler crab: an invertebrate model of c	86
Detection in metacontrast/	326
detection to reduce common channel interference/Orthogonal	131
"developmental dysgraphia"/Serial order in writing: a study of misspell	289
development/Variations and abnormalities in motor	228
deviant and normal speech/Comparison of grammar of children with functio	65

device for automatic programming/A pulser	7
device for the partial restraint of rats in operant conditioning studies	269
diagnosis of renal ischemic hypertension/Measurement of oxygen tension a	120
diagnosis of urologic neoplasms/Urinary LDH (Lactic dehydrogenase) activ	290
diagrams of oral temperature and urinary functions in a healthy man stud	270
diagrams/Similarity and intrusions in short-term memory for consonant-vo	240
dielectric and electro-optic properties of BaTiO ₃ single crystals/Some	169
differences at high frequencies/Note on binaural masking-level	33
difference tests- longitudinal and transverse - On circadian rhythms of	223
Digital communication over fixed time-continuous channels with memory wi	53
Digital picture coding/	280
digits and pairs of digits/Short-term recognition memory for single	239
diode/Statistics of switching-time jitter for a tunnel	305
ischarge patterns of single fibers in the cat's auditory nerve/	176
discharge patterns of spontaneous and continuously stimulated activity i	199
Discriminating among states of consciousness by EEG measurements -- a st	410
discrimination deficits after lesions of nucleus rotundus in the pigeon	277
discrimination/Experimental studies of auditory	420
discrimination following regeneration in planarians/Retention of a	257
discrimination in planarians/Evidence of right-left	30
discrimination in the temporal and nasal sectors of the monocular visual	241
Discrimination of hefted weights; effect of stimulus duration/	212
discrimination of wines/Perceptual learning and the	349
discrimination/Superstitious chaining during temporal	307
discrimination training on generalization of conditioned suppression/The	275
discriminations affected by cortical ablations/Auditory	396
discriminative properties of fixed-ratio performance in the pigeon/Some	403
discriminative responses/Intrinsic organization of cerebral tissue in al	415
(disease)Animal behavior and mental illness/	260
disease/Taxonomies of	375
(disease)The renal lymphatics and therapy of pyelonephritis/	121
diseases/Research in demyelinating	42
Disorders of higher tactile and visual functions/	219
Distinctive features and errors in short-term memory for English vowels/	236
Distributed solution of network programming problems/	31
distribution of flow from orifices and tubes at high Knudson numbers/Ang	428
diurnal activity cycle/Effects of adiurnal lighting and feeding on the r	249
diurnal and a-diurnal feeding/Rat's anticipation of	108
divergences, lacunae/Summation: Convergences	342
DL-norepinephrine-7-H ³ in the avian brain/Distribution of monoamines and	333
DNA coding/On retina-cortex connections and	79
dogs during hypothalamic self-stimulation/Blood pressure and heart rate	196
dogs/The effect of cardiac arrest with closed chest massage on the EEG i	109
dogs using the ring-catheter technique/Chronic basal blood pressures in	310
dogs/Variance spectra of corticosteroid in adrenal venous effluent of	43
dorsal-column linkage conduction velocity, primary velocity, primary aff	218
dorsal cord cells to peripheral cutaneous unmyelinated fibers/Response o	189
dorsal thalamic lesions in rats: alternation and Hebb-Williams maze per	148
dorsolateral spinal cutaneous afferent system/Local, segmental and supra	88
dreaming sleep in man/Urinary excretion of 3-methoxy-4 hydroxymandelic a	293
dreaming sleep in man/Urine volume and osmolarity changes during	294
dreaming/The stress of	392
dreams and memory/Sleep, wakefulness	302
driving-point impedance functions/Some mapping properties of RC and RL	166
Drosophila pseudoobscura pupae: a model for the photoperiodic clock/The	313
drug injections/A method for training unrestrained primates to receive	60

duration/Discrimination of hefted weights; effect of stimulus	212
dysbarism/Patho-physiology of decompression sickness -	426
dysfunction in children: motor deficits/Minimal cerebral	345
dysgraphia"/Serial order in writing: a study of misspelled words in "de	289
EC model/Further results on binaural unmasking and the	314
EC model to interaural JND's/Note on application of the	374
ectopic arrhythmias/Peripheral versus central mechanisms in the condition	74
education and research/A multiuser computation facility for	32
EEG activity in chronic cats/Relationships of neuronal spike populations	251
EEG: A demonstration/Daily correlation of adrenal steroids and alpha fr	301
EEG in dogs/The effect of cardiac arrest with closed chest massage on th	109
EEG in normal men/Circadian periodicity, adrenal corticosteroids, sleep	378
EEG patterns in sleep and wakefulness in monkeys/Effect of interhemisphe	363
EEG sleep patterns/A simple electronic method for graphing	299
EEG tremor relationships in man/Correlation analysis of	359
Effect of acoustic stimuli on spontaneous spike discharges in auditory n	175
effect of cardiac arrest with closed chest massage on classical conditio	27
effect of cardiac arrest with closed chest massage on the EEG in dogs/Th	109
Effect of cerebral ablation on a circadian pituitary adrenocorticotropic	144
effect of discrimination training on generalization of conditioned suppr	275
Effect of interhemispheric transection on the EEG patterns in sleep and	363
effect of masking intensity/Physiological observations of auditory maski	29
effect of megavoltage, total body irradiation on experimental bladder ca	122
effect of novel stimuli on renal secretion collected by the ureteral-shu	398
effect of person on heart rate in monkeys/The	195
effect of stimulus duration/Discrimination of hefted weights;	212
effect of two-dimensional pictorial noise/The subjective	167
Effect of very low frequency tones on auditory threshold/	282
effects during a pre-schedule change stimulus/Rate change	1
Effects of adiurnal lighting and feeding on the rat's diurnal activity c	249
Effects of averaging data during stimulus generalization/	68
effects of delay in reinforcement/Variables determining the	135
Effects of deprivation conditions upon the rat's home cage behavior/	107
effects of early sensory restriction/Neurophysiological	187
Effects of mesencephalic central grey lesions on responses to reinforcin	258
Effects of occipital lobe lesion on pattern vision/	220
effects of SU-4885 in mice/Circadian system-phase dependent toxicity and	37
Effects of unilateral cortical excisions and bilateral hippocampal lesio	128
effects on cortical and subcortical evoked potentials in cat/Hypertonic	401
effects on matching to sample performance/Stimulus change	336
effects on the peripheral auditory apparatus/Temperature	119
effects with equal potential reinforcements during the 'warning stimulus'	15
Efferent connections of the lentiform nucleus in the monkey/	303
Efferent inhibition of auditory nerve responses: dependence on acoustic	412
effluent of dogs/Variance spectra of corticosteroid in adrenal venous	43
Ejaculation evoked by stimulation of the preoptic area in monkey/	319
electrical stimulation as an unconditional stimulus/An attempt to condit	399
electrical stimulation of the brain/Independence of approach and escape	229
electrical stimulation on monkeys/Aspects of the delayed alternation def	147
Electrocardiographic conditioning with hypothalamic stimulation as an unc	13
Electrode problems in central nervous monitoring in performing subjects/	385
Electroencephalogram during orbital flight/	298
Electroencephalographic correlates of temporally spaced responding and a	6
electroencephalographic data reference library/The normative	186
electroencephalographic reference library/Technical details of data acqu	172
Electronic computer techniques for the study of endocrine rhythms/	152

electronic method for graphing EEG sleep patterns/A simple	299
(electronics)A comparison of optimum angle modulation systems and rate-d	231
(electronics)An experimental facility for sequential decoding/	192
(electronics)Another solid state timer/	87
(electronics)A study of the performance of linear and nonlinear filters/	17
(electronics)Bound on impedance functions of R, +L, +C, T networks/	168
(electronics)Bounds on two-element-kind impedance functions/	163
(electronics)Coding color pictures/	45
(electronics)Digital communication over fixed time-continuous channels w	53
(electronics)Discharge patterns of single fibers in the cat's auditory n	176
(electronics)Error bounds for parallel communication channels/	259
(electronics)Experimental studies of handwriting signals/	292
(electronics)Introduction to the problem of the reticular formation/	291
(electronics)On the optimum quantization of stationary signals/	28
(electronics)Optimum angle modulation/	105
(electronics)Optimum prefiltering in sampled data with read-in-jitter/	180
(electronics)Orthogonal detection to reduce common channel interference/	131
(electronics)PCM picture transmission/	164
(electronics)Resistance of an N-dimensional cube/	224
(electronics)Some mapping properties of RC and RL driving-point impedanc	166
(electronics)Some techniques for the synthesis of non-linear systems/	253
electro-optic properties of BaTiO ₃ single crystal/Some dielectric and	169
electrophysiological, biochemical and behavioral study/An arthropod prep	129
electrophysiological data from auditory nerve fibers in cat/A statistica	266
elimination/Solution of systems of polynomial equations by	300
Emotion and the sensitivity of the psychoendocrine system/	364
emotional states/Adrenocortical function in pathological	322
Emulsification of liquid monkey food/	117
encephalopathy/Unusual sensory status in congenital	324
endocrine rhythms/Electronic computer techniques for the study of	152
energy/Minimizing the maximum signal	281
English language/Analysis of the structure of	424
English/On the role of linguistics in the teaching of	404
English vowels/Distinctive features and errors in short-term memory for	236
Enhancement of fixed-ratio performance by briefly presented conditioned	344
environment/A long term study of human performance in a continuously pro	10
environment/Detecting and recording the behavior of animals in a multi-e	9
environmental control/Experimental analysis of complex behavioral reper	26
enzyme activity/Transamidinase activity in mouse kidney - an aspect of c	93
enzyme and membrane systems/Supramolecular organization of	179
Enzyme induction and the psychosomatic hypothesis/	183
(enzyme)Urinary LDH (Lactic Dehydrogenase) activity in the diagnosis of	290
equations by elimination/Solution of systems of polynomial	300
equations/Functional analysis of systems characterized by nonlinear diff	308
Error bounds for parallel communication channels/	259
error criteria based on the use of gate functions/Determination of opti	204
errors in short-term memory/Acoustic similarity and intrusion	235
errors in short-term memory for English vowels/Distinctive features and	236
escape and punishment situation/Simulated gravity(2g): The aversive stim	393
escape reactions to electrical stimulation of the brain/Independence of	229
estimation/Generalized SNR and performance index of filters for waveform	96
estimation of continuous random processes/Bounds on the accuracy attaina	348
estimation with special reference to 24-hour synchronized circadian rhyt	217
Evidence of right-left discrimination in planarians/	30
evoked cerebral responses in man/Functional relations between stimulus i	232
evoked potentials in cat/Hypertonic urea: its effects on cortical and s	401
evoked responses in relation to temporal conditioning to paired stimuli	360

evoked responses/A method for analyzing variations in	252
evoked vocal response of the bullfrog/The	113
examination of behaviorally induced changes in the protein and nucleic a	245
excisions and bilateral hippocampal lesions/Tactually-guided maze learni	128
excretion: a polyvariable case study/Mood, motility and 17-hydroxycorti	331
excretion in man/Indolylacroyl glycine	184
excretion of 3-methoxy-4-hydroxymandelic acid during dreaming sleep in m	293
(excretory system)Urinary reflux - the physician's dilemma/	366
experiment/Second order avoidance behavior under 24-hour control	377
experimental analysis of behavior/Programmed environments for the	262
Experimental analysis of complex behavioral repertoires under continous	26
experimental analysis of psychosomatic disorders/Instrumental behavior a	25
experimental analysis of some psychosomatic problems/Behavior stress and	24
Experimental basis of quantitative radiorenography for evaluating renal	373
experimental bladder calculogenesis/The effect of megavoltage, total body	122
experimental environment/A long-term study of human performance in a con	10
experimental facility for sequential decoding/An	192
experimental outline for building and exploring multi-operant behavioral	4
experimental space/A combination lock for automatic programming of two a	38
Experimental studies of auditory discrimination/	420
Experimental studies of handwriting signals/	292
Experiments on computer recognition of connected handwritten words/	67
experiments through motion picture films/Presentation of laboratory	350
exploring multi-operant behavioral repertoires/An experimental outline f	4
expressions for optimum linear filtering in white noise II./Some useful	215
extraction and bioassay of renin/A simplified method for the	284
Extraction and bioassay of renin from kidneys of sodium-depleted and sod	371
extrasystoles using direct myocardial electrical stimulation as an uncon	399
eye movement sleep/Biochemical aspects of rapid	182
Facilitation and inhibition in the visual system after photic stimulatio	114
Facilitation of large ratio performance by use of conditioned reinforcem	137
facilitation of short-term memory/Interlingual	286
facility for education and research/A multiuser computation	32
facility for sequential decoding/An experimental	192
Failure to train planarians reliably/	22
fear/Timing behavior and conditioned	69
feeding on the rat's diurnal activity cycle/Effects of adiurnal lighting	249
feeding/Rat's anticipation of diurnal and a-diurnal	108
female adult before, during and after her isolation underground for thre	315
fibers/Effect of acoustic stimuli on spontaneous spike discharges in aud	175
fibers in cat/A statistical analysis of electrophysiological data from a	266
fibers in the cat's auditory nerve/Discharge patterns of single	176
fibers/On the propagation of the nervous impulse down medullated and unm	312
fibers/Probabilities with spike discharges in auditory nerve	146
fibers/Response of single dorsal cord cells to peripheral cutaneous unmy	174
fibres/Presynaptic hyperpolarization: A role for fine afferent	63
fiddler crab: an invertebrate model of circadian desynchronization/The	86
fields of retinal ganglion cells of the rat/Dendritic	110
films/A demonstration of ion-exchange phenomena in phospholipid mono-mol	320
filtering in white noise II./ Some useful expressions for optimum linear	215
filters/A study of the performance of linear and nonlinear	17
filters for waveform estimation/Generalized SNR and performance index of	96
finite order/Measurement of the kernels of a nonlinear system of	205
fixed time-continuous channels with memory-with special application to t	53
fixed-ratio performance by briefly presented conditioned reinforcing sti	344
fixed-ratio performance in the pigeon/Some discriminative properties of	403

Fixed-ratio punishment with continuous reinforcement/	52
fixed-ratio schedule/Time out from a	222
flux through axon membranes/A theory of passive ion	59
focal brain injury/The lesson of	338
food/Emulsification of liquid monkey	117
forebrain bundle-lateral hypothalamic area and reinforcing brain stimula	346
form perception/On the modifiability of	273
formation/Introduction to the problem of the reticular	291
formation/Towards a theory of the reticular	58
forward and backward masking/A comparison of	207
Forward and backward masking as a function of relative overlap and inten	325
frequencies/Note on binaural masking-level differences at high	33
frequency bioelectric signals/A simple time-division multiplexing system	362
frequency in the EEG: a demonstration/Daily correlation of adrenal ster	301
frequency tones on auditory threshold/Effect of very low	282
frog/Responses to acoustic stimuli from single units in the eighth nerve	81
(frog)The evoked vocal response of the bullfrog/	113
frontal-lobe lesions in rodents, carnivores and primates/Some behavioral	341
function in neurons, neuronal nets, and the brain/Molecular and ultrastr	327
function in pathological emotional states/Adrenocortical	322
function/Molecular correlates of brain	405
function of amount of reinforcement/Timing behavior as a	103
function of reinforcement magnitude and density/Rate of intracranial sel	19
function of relative overlap and intensity of test and masking stimuli/F	325
function/Role of protein in neural	210
function/The synapse: morphological and chemical correlates of	202
Functional analysis of systems characterised by nonlinear differential e	308
functional correlates/Brain and nerve proteins:	209
Functional relations between stimulus intensity and photically evoked ce	232
functionally deviant and normal speech/Comparison of grammar of children	65
functions, ancient and modern of circadian oscillation/Biological clocks	200
functions/Bounds on two-element-kind impedance	163
functions/Determination of optimum nonlinear systems for generalized err	204
functions/Disorders of higher tactile and visual	219
functions in a healthy man studied longitudinally/Circadian phase diagra	249
functions in the vertebrate nervous system/The organization of memory	134
functions/Measurement of correlation	82
functions of different states of wakefulness and sleep/Variations on the	127
functions of R, +L, +C, T networks/Bounds on impedance	168
functions related to memory/Some brain structures and	71
functions/Some mapping properties of RC and RL driving point impedance	166
ganglion cells of the rat/Dendritic fields of retinal	110
ganglion cells: receptive field organization and maintained activity/Ra	111
Gemini flight GT-7 and computation to be used in 30 day primate flight/A	358
Gemini flight GT-7 data with specification of on-line computing requirem	244
generalization/Effects of averaging data during	68
generalization of conditioned suppression/The effect of discrimination tr	275
generalization"/On the acquisition of syntax: a critique of "contextual	104
Generalized SNR and performance index of filters for waveform estimation/	96
generating station/Acentral probability	157
generation of random interval schedules/The	118
Glass-coated tungsten microelectrodes/	107
Glia bibliography/	61
glycine excretion in man/Indolylacroyl	184
glycogen of mice during inanition and dehydration/Persisting circadian r	271
'good'/Semantic theory and the meaning of	56

grammar/Alternation of rules in children's	64
grammar in speech perception/The active use of	264
grammar of children with functionally deviant and normal speech/Comparis	65
grammars/A note on asymmetry in phrase structure	62
graphing EEG sleep patterns/A simple electronic method for	299
gravity/Animal behavior in fields of simulated	390
gravity(2g): the aversive stimulus in an instrumental escape and punis	393
grey lesions on responses to reinforcing brain stimulation/The effects o	258
growth responses to simulated weightlessness induced by the Nogravatron,	279
habituated responses in limulus/Test of cross-optic transfer of	372
habituation using spreading depression/Transfer of	334
(hallucinogen)Remarks on LSD/	340
hamster/Curiosity in the	211
handwriting signals/Experimental studies of	292
handwritten words/Experiments on computer recognition of connected	67
head and auditory meatus of the cat/On the sound pressure transformation	355
heart failure/Transport of sodium by the lymphatics in simulated congest	368
heart rate and instrumental avoidance behavior in the rhesus monkey/Conc	14
heart rate changes during sinus arrhythmia/Blood pressure and	194
heart rate changes in dogs during hypothalamic self-stimulation/Blood pr	196
heart rate in monkeys/The effect of person on	195
(heart)The effect of cardiac arrest with closed chest massage on the EEG	109
Hebb-Williams maze performance/Caudate, cortical, hippocampal and dorsal	148
hepatic glycogen of mice during inanition and dehydration/Persisting cir	271
hibernators/The internal rhythms of	423
Hidatsa syntax/	185
hippocampal and dorsal thalamic lesions in rats: alternation and Hebb-W	148
hippocampal lesions/Tactually-guided maze learning in man: effects of u	128
histological studies of postnatal neurogenesis/Autoradiographic and	248
(hormone)Electronic computer techniques for the study of endocrine rhyth	152
(hormone)Spectral resolution of low-frequency, small-amplitude rhythms i	150
(hormone)Transport of renin-angiotensin by renal lymphatics/	125
(hormone)Variance spectra of corticosteroid in adrenal venous effluent o	43
hormones/Autoradiographic and implantation studies of sex	198
hour synchrononized circadian rhythms/Methodologic aspects of human time	217
human blood/Cosinor-evaluation of circadian rhythm with low amplitude in	267
human brain lesions and memory changes/Correlations between specific	72
human cancer, reevaluated by electronic computer programs - evidence for	379
human performance in a continuously programmed experimental environment/	10
human time estimations with special reference to 24-hour synchronize ci	217
hyperpolarization: A role for fine afferent fibres/Presynaptic	63
hypertension/Measurement of oxygen tension and saturation in the diagnos	120
hypothalamic area and reinforcing brain stimulation/The medial forebrain	346
hypothalamic self-stimulation/Blood pressure and heart rate changes in d	196
hypothalamic stimulation as an unconditional stimulus/Electrocardiograph	13
hypothalamic stimulation/Attenuation of aversive properties of periphera	130
hypothalamic stimulation in satiated rats: T-maze learning for food/Lat	190
hyperthermia/The enhancement of regional bladder megavoltage irradiation	370
hypothesis/Enzyme induction and the psychosomatic	183
ideograms/Some possibilities for the study of visual-oculomotor processe	361
illness/Animal behavior and mental	260
Immunologic and psychic memory/	16
immunological studies of nerve axon protein/Chemical, structural	84
impedance functions/Bounds on two-element-kind	163
impedance functions of R, +L, +C, T networks/Bounds on	168
impedance functions/Some mapping properties of RC and RL driving-point	152
implantation studies of sex hormones/Autoradiographic and	198

Impulses originating in the region of dendrites/	233
inanition and dehydration/Persisting circadian rhythm in hepatic glycoge	250
Independence of approach and escape reactions to electrical stimulation	229
index of filters for waveform estimation/Generalized SNR and performance	96
Indolylacroyl glycine excretion in man/	184
induced changes in the protein and nucleic acid metabolism of the brain	245
induced increase in tryptophan turnover along inducible pathways in man	295
induction and the psychosomatic hypothesis/Enzyme	183
information in vision/Note on short-term storage of	34
Information processing and decision making by man. I. Limitations on t	421
Information processing and decision making by man. II. Evidence of per	425
information processing mechanisms/Macromolecular conformation changes as	18
information/Regeneration of retention of acquired	427
information/Reinforcing value of	158
information storage and readout in biological systems/Chemical means of	35
information stored in single neurons/Types of	422
information/The organization of cerebral tissue in transaction and stora	357
information through the central nervous-system/Processing and transmitti	155
information transaction and storage in brain tissue/Neurophysiological c	416
inhibition in the visual system after photic stimulation/Facilitation an	114
inhibition of auditory nerve responses: dependence on acoustic stimulus	412
injections/A method for training unrestrained primates to receive drug	60
injury/Alterations in perception after brain	337
injury and death/Organisms as circadian systems; temporal analysis of t	46
injury/The lesson of focal brain	338
instrumental avoidance behavior in the rhesus monkey/Concurrent measurem	14
instrumental behavior and psychophysical change: A comparative approach	25
insulin coma by saccharin/The potentiation of	230
integrated theory of linguistic description/An	57
intensity and photically evoked cerebral responses in man/Functional rel	232
intensity difference for brief impulsive stimuli/Minimum detectable chan	50
intensity of test and masking stimuli/Forward and backward masking as a	325
intensity/Physiological observations of auditory masking. Effect of mas	29
interaction in the accessory superior-olivary nucleus of the cat/Binaura	154
Interaction of positive and negative reinforcing neural systems/	92
interaction with a dorsolateral spinal cutaneous, afferent system/Local,	88
interaural JND's/Note on application of the EC model to	374
interaural time of intensity difference for brief impulsive stimuli/Mini	50
interference in short-term memory for single letters/Phonemic similarity	353
interference/Orthogonal detection to reduce common channel	131
Interlingual facilitation of short-term memory/	286
interpretation with reinforcing brain stimulation/Problems of measuremen	90
interval schedules/Observing behavior during	274
interval schedules/The generation of random	118
intervals/Spectral analysis of steroid rhythms in data at equal or unequ	36
intracranial self-stimulation as a function of reinforcement magnitude a	19
intrusion errors in short-term memory/Acoustic similarity and	235
intrusions in short-term memory for consonant-vowel diagrams/Similarity	240
invertebrate model of circadian desynchronization/The blinded fiddler cr	86
(invertebrate)Retention of a discrimination following regeneration in pl	257
(invertebrate)Test of cross-optic transfer of habituated responses in li	372
(invertebrates)Evidence of right-left discrimination in planarians/	30
investigation of barley seedling growth responses to simulated weightles	279
in vitro culture and autoradiographic studies of neurons in aplysia/Prol	335
ion-exchange phenomena in phospholipid monomolecular films/A demonstrati	320
ion-flux through axon membranes/A theory of passive	59
ions do not pass the membrane of the giant axon/Caesium	76

irradiation in bladder cancer using local bladder hyperthermia/The enhan	370
irradiation on experimental bladder calculogenesis/The effect of megavol	122
ischemia/Experimental basis of quantitative radiorenography for evaluati	373
ischemic hypertension/Measurement of oxygen tension and saturation in th	120
isodendritic core of the brain stem/The	304
isolation underground. The study of two healthy adult subjects before,	332
jitter for a tunnel diode/Statistics of switching-time	305
jitter/Optimum prefiltering in sampled data with read-in	180
JND's/Note on application of the EC model to interaural	374
kernels of a non-linear system/Measurement of the Wiener	178
kernels of a non-linear system of finite order/Measurement of the	205
ketosteroid; probable androgen-induced circaseptan desynchronization/Sp	150
kidney - an aspect of circadian periodic enzyme activity/Transamidinase	80
(kidney)Experimental basis of quantitative radiorenography for evaluatin	373
(kidney)Measurement of oxygen tension and saturation in the diagnosis of	120
(kidney)Renal lymph oxygen tension during graded renal ischemia/	369
(kidney)The renal lymphatics: an active fluid transport system/	367
(kidney)The renal lymphatics and therapy of pyelonephritis/	121
(kidney)Transport of renin-angiotension by renal lymphatics/	125
kidneys of sodium-depleted and sodium-loaded rats/Extraction and bioassa	371
Knudson numbers/Angular distribution of flow from orifices and tubes at	428
laboratory experiments through motion picture films/Presentation of	350
(lactic dehydrogenase) activity in the diagnosis of urologic neoplasms/U	290
lacunae/Summation: convergences, divergences,	342
language, a critique of Wittgenstein/Operationalism and ordinary	141
"language and thought"/Review of J. Carroll's	139
language/The philosophy of	171
language/The philosophy of	283
languages/A conjecture concerning non-context free	297
lanthanum on cell membrane/Staining properties of	132
latency, adaptation level and metacontrast/Photoreceptor	317
+L, +C, T networks/Bounds on impedance functions of R,	168
LDH (Lactic Dehydrogenase) activity in the diagnosis of urologic neoplas	290
learning and the discrimination of wines/Perceptual	349
learning/A re-examination of "prolonged retrograde amnesia" in one-trial	255
learning for food/Lateral hypothalamic stimulation in satiated rats: t-m	190
learning in man: effects of unilateral cortical excisions and bilateral	128
learning/Molecular parameters in memory and	328
learning/The physical basis of life and	208
lentiform nucleus in the monkey/Efferent connections of the	303
lesion on pattern vision/Effects of occipital lobe	220
lesions and memory changes/Correlations between specific human brain	72
lesions/Delayed alternation performance in patients with cerebral	254
lesions in rats: alternation and Hebb-Williams maze performance/Caudate	148
lesions in rodents, carnivores and primates/Some behavioral consequences	341
lesions - mammillary nuclei and associated complex of cat brain/Quantita	40
lesions of nucleus rotundus in the pigeon/Brightness and pattern discrim	277
lesions on responses to reinforcing brain stimulation/The effects of mes	258
lesions/Tactually-guided maze learning in man: effects of unilateral co	128
letters and words/Naming sequentially present	288
letters/Short-term recognition memory for normal and whispered	238
leucine by the brain/Behavioral influences on the utilization of ³ H	246
library/Technical details of data acquisition for the normative electroe	172
library/The normative electroencephalographic data reference	186

life and learning/The physical basis of	208
light-dark ratio/Brightness enhancement in intermittent light: variatio	352
light of 30 lux intensity/Reproducibility of circadian temperature rhyth	382
lighting and feeding on the rat's diurnal activity cycle/Effects of adiu	249
light: variation of luminance and light-dark ratio /Brightness enhancem	352
limbic stimulation in man: localization of stimulus sites/Corticosteroid	323
limulus/Test of cross-optic transfer of habituated responses in	372
linear and nonlinear filters/A study of the performance of	17
linear filtering in white noise II/Some useful expressions for optimum	215
linguistic description/An integrated theory of	57
linguistic segments/The psychological reality of	140
(linguistics)A conjecture concerning non-context-free languages/	297
(linguistics)Analysis of the structure of English language/	424
(linguistics)Catawba texts/	395
(linguistics)Hidatsa syntax/	185
linguistics in the teaching of English/On the role of	404
(linguistics)Interlingual facilitation of short-term memory/	286
linguistics/Mentalism in	55
(linguistics)Operationalism and ordinary language, a critique of Wittgen	141
(linguistics)Questions/	365
(linguistics)Questions of reference/	387
(linguistics)Reading and talking bilingually/	287
(linguistics)Reading temporally and spatially transformed text/	389
(linguistics)Review of J. Carroll's "Language and Thought"/	139
(linguistics)The philosophy of language/	171
(linguistics)Two-way languages/	394
linkage, conduction velocity, primary velocity, primary afferent spectru	218
lobe lesion on pattern vision/Effects of occipital	220
Local, segmental and supraspinal interaction with a dorsolateral spinal	88
localization and organization/Book review: cerebral	227
localization of stimulus sites/Corticosteroid responses to limbic stimul	323
lock for automatic programming of two animals in a single experimental s	39
longitudinal and transverse - on circadian rhythms of C mice/Phase diffe	223
longitudinal and transverse profiles of rhythms/Some aspects of biologic	149
low-frequency bioelectric signals/A simple time-division multiplexing sy	362
low-frequency, small-amplitude rhythms in excreted ketosteroid; probable	150
low-temperature biology/Memory storage and	70
LSD/Remarks on	340
luminance and light-dark ratio/Brightness enhancement in intermittent li	352
Lurial: higher cortical functions in man/Preface to A.R.	339
lymph during treatment of pyelonephritis/Significance of antibacterial le	256
lymph oxygen tension during graded renal ischemia/Renal	369
lymphatics: an active fluid transport system/The renal	367
lymphatics and therapy of pyelonephritis/The renal	121
lymphatics in simulated congestive heart failure/Transport of sodium by	368
lymphatics/Transport of renin-angiotension by renal	125
machine computations/One-tape, off-line turing	160
machine computations/On-line turing	276
Machine dependence of degrees of difficulty/	98
macromolecular coding in neuronal memory/On the nature of	12
Macromolecular conformation changes as possible information processing m	18
magnitude and density/Rate of intracranial self-stimulation as a functio	19
Mammillary complex of cat brain-aspects of quantitative organization/	263
mammillary nuclei and associated complex of cat brain/Quantitative neuro	40
man/ACTH induced increase in tryptophan turnover along induceable pathwa	295
man/Activation of the pituitary-adrenal axis during rapid eye movement s	296

man/Circadian rhythms in	99
man during the two months of staying underground/Broad study of the circ	153
man: effects of unilateral cortical excisions and bilateral hippocampal	128
man/Functional relations between stimulus intensity and photically evoke	232
man/Indolylacroyl glycine excretion in	184
man/I. Limitations on transmission rate in sequential actions. Informa	421
man:Localization of stimulus sites/Corticosteriod responses to limbic st	323
man/Rhinencephalic regulation of the pituitary-adrenal axis in	419
man/Some observations on evoked responses in relation to temporal condit	360
man studied longitudinally/Circadian phase diagrams of oral temperature	270
man/Urinary excretion of 3-methoxy-4-hydroxymandelic acid during dreamin	293
man/Urine volume and osmolarity changes during dreaming sleep in	294
mapping properties of RC and RL driving-point impedance functions/Some	166
masking/A comparison of forward and backward	207
masking as a function of relative overlap and intensity of test and unma	325
masking. Effect of masking intensity/Physiological observations of audi	29
masking-level differences at high frequencies/Note on binaural	33
"masking"/Observations pertaining to the mechanism of	3
masking stimuli/Forward and backward masking as a function of relative o	325
matching to sample performance/Stimulus change effects on	336
Mathematical concepts of central nervous system function/	216
(mathematics)Bounds on the accuracy attainable in the estimation of cont	348
(mathematics)Determination of optimum nonlinear systems for generalized	204
(mathematics)Measurement of the kernels of a nonlinear system of finite	205
(mathematics)Measurement of the Wiener kernels of a nonlinear system/	178
(mathematics)Some aspects of the Wiener theory of nonlinear systems/	177
(mathematics)Superposition in a class of nonlinear systems/	193
(mathematics)Synthesis of a class of nonlinear systems/	206
maximum signal energy/Minimizing the	281
maze learning in man: effects of unilateral cortical excisions and bila	128
maze performance/Caudate, cortical, hippocampal and dorsal thalamic lesi	148
meaning be an r_m ?/Could	138
meaning of 'good'/Semantic theory and the	56
measurement and interpretation with reinforcing brain stimulation/Proble	90
Measurement of correlation functions/	82
measurement of heart rate and instrumental avoidance behavior in the rhe	14
measurement of multidimensional transducers/Sequential	85
Measurement of oxygen tension and saturation in the diagnosis of renal i	120
Measurement of the kernels of a nonlinear system of finite order/	205
Measurement of the Wiener kernels of a non-linear system by cross-correl	178
measurements -- a study of four subjects/Discriminating among states of	410
meatus of the cat/On the sound pressure transformation by the head and a	355
mechanism of "masking"/Observations pertaining to the	3
mechanisms: A new theory/Pain	188
mechanisms/Cellular regulatory	8
mechanisms in the conditioning of ectopic arrhythmias/Peripheral versus	74
mechanisms/Macromolecular conformation changes as possible information p	18
medial forebrain bundle-lateral hypothalamic area and reinforcing brain	346
medullated and unmedullated fibers/On the propagation of the nervous imp	312
megavoltage, total body irradiation on experimental bladder calculogenes	122
membrane of the giant axon/Caesium ions do not pass the	76
membrane/Staining properties of lanthanum on cell	132
membrane systems/Supramolecular organization of enzyme and	179
membranes/A theory of passive ion flux through axon membranes	59
membranes/The role of water structures in the molecular organization of	51
memory/Acoustic similarity and intrusion errors in short-term	235

memory and learning/Molecular parameters in	328
Memory bibliography/	133
memory changes/Correlations between specific human brain lesions and	72
memory/Cortical unit analysis and	41
memory for consonant-vowel diagrams/Similarity and intrusions in short-t	240
memory for English vowels/Distinctive features and errors in short-term	236
memory for normal and whispered letters/Short-term recognition	238
memory for phonemically similar lists/Short-term	237
memory for single digits and pairs of digits/Short-term recognition	239
memory for single letters/Phonemic similarity and interference in short-	353
memory functions in the vertebrate nervous system/The organization of	134
memory/Immunologic and psychic	16
memory/Interlingual facilitation of short-term	286
memory/Molecules and	83
memory/On the nature of macromolecular coding in neuronal	12
memory/Self-induction and	80
memory/Sleep, wakefulness, dreams and	302
memory/Some brain structures and functions related to	71
Memory storage and low-temperature biology/	70
memory-with special application to telephone channels/Digital communicat	53
men/Circadian periodicity, adrenal corticosteroids, sleep deprivation an	378
mental illness/Animal behavior and	260
mental states/The cooperative behavior of neuronal populations during sl	243
Mentalism in linguistics/	55
mesencephalic central grey lesions on responses to reinforcing brain sti	258
messages and functions of different states of wakefulness and sleep/Vari	127
metabolism of the brain/Autoradiographic examination of behaviorally ind	245
metacontrast/Detection in	326
metacontrast/Photoreceptor latency, adaptation level and	317
method for analysing variations in evoked responses/A	252
method for the extraction and bioassay of renin/A simplified	284
method for training unrestrained primates to receive drug injections/A	60
method/The effect of novel stimuli on renal secretion collected by the u	398
Methods for completely deciphering the neuronal circuitry of brain struc	143
Methodologic aspects of human time estimations with special reference to	217
mice as related to age/Arterial pressure in CBA	161
mice/Circadian system-phase dependent toxicity and other effects of SU-4	37
mice during inanition and dehydration/Persisting circadian rhythm in hep	271
microelectrodes/Glass-coated tungsten	101
microneurons in the rat brain/Postnatal origin of	97
microscopy/Resolving power of electronic computers in temporal pathology	381
Mitotic rhythms in human cancer, reevaluated by electronic computer prog	379
mitosis of starving, dehydrated C mice/Circadian rhythmic pituitary adre	151
model for the photoperiodic clock/The circadian oscillation in Drosophil	313
model/Further results on binaural unmasking and the EC	314
model of alimentary systems/A new	318
model of circadian desynchronization/The blinded fiddler crab: an inver	86
model of the peripheral auditory system/A	411
model to interaural JND's/Note on application of the EC	374
Modulation and demodulation for probabilistic coding/	356
modulation/Optimum angle	105
modulation systems and rate-distortion bounds/A comparison of optimum an	231
Molecular and ultrastructural correlates of function in neurons, neurona	327
Molecular correlates of brain function/	405
molecular organization of cell membranes/The role of water structures in	51
Molecular parameters in memory and learning/	328
Molecules and memory/	83

monkey/Concurrent measurement of heart rate and instrumental avoidance b	14
monkey/Efferent connections of the lentiform nucleus in the	303
monkey/Ejaculation evoked by stimulation of the preoptic area in the	319
monkeys/Aspects of the delayed alternation deficits produced by electric	147
monkeys/Effect of interhemispheric transection on the EEG patterns in sl	363
monkeys/The effect of person on heart rate in	195
monoamines and regional uptake of DL-norepinephrine -7-H ³ in the avian b	333
monocular visual field/Comparison of spatial discrimination in the tempo	241
Mood, motility, and 17-hydroxycorticoid excretion: a polyvariable case	331
morphological and chemical correlates of function/The synapse:	202
(morphology)Methods for completely deciphering the neuronal circuitry o	143
morphology; procedures and illustrative examples/Circadian system phase	383
motility, and 17-hydroxycorticoid excretion: a polyvariable case study/	331
motion picture films/Presentation of laboratory experiments through	350
Motivational properties of long durations of rewarding brain stimulation	162
motor deficits/Minimal cerebral dysfunction in children:	345
motor development/Variations and abnormalities in	228
motor mechanisms/Central nervous system:	376
mouse kidney - an aspect of circadian periodic enzyme activity/Transamid	93
movement sleep/Biochemical aspects of rapid eye	182
multidimensional transducers/Sequential measurement of	85
multiple unit studies/The real-time sorting of neuroelectric action pote	214
multiplexing system for low-frequency bioelectric signals/A simple time-	362
multiuser computation facility for education and research/A	32
(muscle)Central nervous system: motor mechanisms/	376
myocardial electrical stimulation as an unconditional stimulus/An attempt	399
nasal sectors of the monocular visual field/Comparison of spatial discri	241
N-dimensional cube/Resistance of an	224
negative reinforcing neural systems/Interaction of positive and	92
neoplasms/Urinary LDH (Lactic Dehydrogenase) activity in the diagnosis o	290
nerve and cochlear nucleus/Stimulus coding in the auditory	173
nerve axon protein/Chemical, structural, and immunological studies of	84
nerve/Discharge patterns of single fibers in the cat's auditory	176
nerve fibers/Effect of acoustic stimuli on spontaneous spike discharges	175
nerve fibers/Probabilities with spike discharge in auditory	146
nerve fibers in cat/A statistical analysis of electrophysiological data	245
nerve of the green frog/Responses to acoustic stimuli from single units	81
nerve proteins: functional correlates/Brain	209
nerve responses: dependence of acoustic stimulus parameters/Efferent in	412
nervous, cardiovascular and visuomotor studies relating to spatial orien	414
nervous impulse down medullated and unmedullated fibers/On the propagati	312
nervous monitoring in performing subjects/Electrode problems in central	385
(nervous system)A method for analyzing variations in evoked responses/	252
nervous system function/Mathematical concepts of central	216
(nervous system)Impulses originating in the region of dendrites/	233
nervous system: motor mechanisms/Central	376
nervous system/Processing and transmitting information through the centr	155
nervous system/The organization of memory functions in the vertebrate	134
network programming problems/Distributed solution of	31
networks/Bounds on impedance functions of R, +L, +C, T	168
neural function/Role of protein in	210
neural systems/Interaction of positive and negative reinforcing	92
neuroanatomic studies implemented by ultrasonic lesions - mammillary nuc	40
neuro-electric action potentials in multiple unit studies/The real-time	214
neurogenesis/Autoradiographic and histological studies of postnatal	248
neuronal circuitry of brain structures/Methods for completely deciphering	143

neuronal memory/On the nature of macromolecular coding in	12
neuronal nets, and the brain/Molecular and ultrastructural correlates of	327
neuronal populations during sleep and mental states/The cooperative beha	243
neuronal spike populations and EEG activity in chronic cats/Relationship	251
neurons in aplysia/Prolonged in vitro culture and autoradiographic studi	335
neurons, neuronal nets, and the brain/Molecular and ultrastructural corr	327
neurons/Some implications of the stochastic behavior of primary auditory	213
neurons/Types of information stored in single	422
Neurophysiological correlates of information transaction and storage in	416
neurophysiological data/Concepts of cerebral organization arising from t	95
Neurophysiological effects of early sensory restriction/	187
neurophysiology of anesthesiology/The	413
Neurosciences research symposium summaries/	330
neurosciences/Specificity in the	234
New and strange systems/	329
Noggravatron, a two axis rotation apparatus/An investigation of barley se	279
noise/The power density spectrum of television random	165
noise/The subjective effect of two-dimensional pictorial	167
non-context free languages/A conjecture concerning	297
nonlinear differential equations/Functional analysis of systems characte	308
nonlinear filters/A study of the performance of linear and	17
nonlinear system/Measurement of the Wiener kernels of a	178
nonlinear system of finite order/Measurement of the kernels of a	205
nonlinear systems for generalized error criteria based on the use of gat	204
nonlinear systems/Some aspects of the Wiener theory of	177
nonlinear systems/Some techniques for the synthesis of	253
nonlinear systems/Superposition in a class of	193
nonlinear systems/Superposition in a class of	73
nonlinear systems/Synthesis of a class of	206
non-punished behavior by stimulus change/Disruption of punished and	306
normal and whispered letters/Short-term recognition memory for	238
normal speech/Comparison of grammar of children with functionally devian	65
note on asymmetry in phrase structure grammars/A	62
Note on binaural masking-level differences at high frequencies/	33
Note on recurrent codes/	23
Note on short-term storage of information in vision/	34
note on time out from avoidance with the chimpanzee/A	136
nuclei and associated complex of cat brain/Quantitative neuroanatomic st	40
nucleic acid metabolism of the brain/Autoradiographic examination of beh	245
nucleus after destruction of the cochlea/Spontaneous spike discharge fro	285
nucleus in the monkey/Efferent connections of the lentiform	303
nucleus of anesthetized cats/Spike discharge patterns of spontaneous and	199
nucleus of the cat/Binaural interaction in the accessory superior-olivar	154
nucleus rotundus in the pigeon/Brightness and patterns discrimination de	277
nucleus/Stimulus coding in the auditory nerve and cochlear	173
nucleus/Stimulus coding in the cochlear	174
nucleus: Tone-burst stimulation/Classification of response patterns of	311
nucleus: Waveforms of extracellularly recorded spike potentials/Anterov	400
(nutrition)Emulsification of liquid monkey food/	117
observations/Decisions based on conflicting and inaccurate	102
observations of auditory masking. Effect of masking intensity/Physiolog	29
Observations pertaining to the mechanism of "masking"/	3
occipital lobe lesion on pattern vision/Effect of	220
off-line turing machine computations / One-tape	160
(olfactory system)Speculations on smell/	391
One-tape, off-line turing machine computations /	160

one-trial learning/A re-examination of "prolonged retrograde amnesia" in	255
on-line computing requirements/Analysis of baseline and Gemini flight GT	244
On-line turing machine computations/	276
operant conditioning studies/A device for the partial restraint of rats	269
Operationalism and ordinary language, a critique of Wittgenstein/	141
optic tectum of the pigeon (<i>Columba livia</i>)/Projections of	170
Optimum angle modulation/	105
Optimum prefiltering in sampled data with read-in jitter/	180
Optimum quantization/	112
optimum quantization of stationary signals/On the	28
oral temperature and urinary functions in a healthy man studied longitud	270
orbital flight/Electroencephalogram during	298
order/Measurement of the kernels of a nonlinear system of finite	205
Organic foundations of animal behavior/	247
Organisms as circadian systems; temporal analysis of their physiologic	46
organization and maintained activity/Rat retinal ganglion cells: recept	111
organization arising from time series analysis of neurophysiological data	95
organization/Book review: cerebral localization and	227
organization/Mammillary complex of cat brain-aspects of quantitative	263
organization of cell membranes/The role of water structures in the molec	51
organization of cerebral tissue in transaction and storage of informatio	357
organization of enzyme and membrane systems/Supramolecular	179
organization of memory functions in the vertebrate nervous system/The	134
oriental ideograms/Some possibilities for the study of visual-oculomotor	361
orientation in a 30 day primate flight/Central nervous, cardiovascular a	414
orienting and discriminative responses/Intrinsic organization of cerebra	415
orifices and tubes at high Knudson numbers/Angular distribution of flow	428
origin of microneurons in the rat brain/Postnatal	97
Orthogonal detection to reduce common channel interference/	131
oscillation in <i>Drosophila pseudoobscura</i> pupae: a model for the photoper	313
oscillations/Biological clocks - the functions, ancient and modern of ci	200
(oscilloscope)/Anteroventral cochlear nucleus: waveforms of extracellul	400
(oscilloscope)Effect of acoustic stimuli on spontaneous spike discharges	175
(oscilloscope)Probabilities with spike discharges in auditory nerve fibe	146
osmolarity changes during dreaming sleep in man/Urine volume and	294
overlap and intensity of test and masking stimuli/Forward and backward m	325
oxygen tension and saturation in the diagnosis of renal ischemic hyperten	120
Oxygen uptake rhythms in a cockroach gauged by variance spectra/	77
 Pain mechanisms: a new theory/	 188
panting/Sinus arrhythmia during	197
parallel communication channels/Error bounds for	259
parameters in memory and learning/Molecular	328
partial restraint of rats in operant conditioning studies/A device for t	269
passive ion flux through axon membranes/A theory of	59
pathologic responses, including injury and death/Organisms as circadian	46
pathological emotional states/Adrenocortical function in	322
pathology - an analogy to microscopy/Resolving power of electronic compu	381
pathology/Mitotic rhythms in human cancer, reevaluated by electronic com	379
Patho-physiology of decompression sickness-dysbarism/	426
patients with cerebral lesions/Delayed alternation performance in	254
pattern discrimination deficits after lesions of nucleus rotundus in the	277
pattern vision/Effects of occipital lobe lesion on	220
patterns/A simple electronic method for graphing EEG sleep	299
patterns during temporally spaced responding/Complex response	21
patterns of single fibers in the cat's auditory nerve/Discharge	176
patterns of spike discharges for units in the cochlear nucleus: tone-bu	311

patterns of spontaneous and continuously stimulated activity in the coch	199
Pavlovian typology: comparative comments on the development of a scient	409
payload and integration with a sounding rocket/Development of a small an	418
PCM picture transmission/	164
perception after brain injury/Alterations in	337
perception/On the modifiability of form	273
perception/The active use of grammar in speech	264
perception with the visual cliff/Studying depth	351
Perceptual learning and the discrimination of wines/	349
performance by briefly presented conditioned reinforcing stimuli/Enhance	344
performance by use of conditioned reinforcement/Facilitation of large ra	137
performance/Caudate, cortical, hippocampal and dorsal thalamic lesions i	148
performance in a continuously programmed experimental environment/A long	10
performance index of filters for waveform estimation/Generalized SNR and	96
performance in patients with cerebral lesions/Delayed alternation	254
performance in the pigeon/Some discriminative properties of fixed-ratio	403
performance of linear and nonlinear filters/A study of the	17
performance simulations/Biosatellite	94
performance/Stimulus change effects on matching to sample	336
peripheral cutaneous unmyelinated fibers/Response of single dorsal cord	189
periodic enzyme activity/Transamidinase activity in mouse kidney - an as	93
periodicity, adrenal corticosteroids, sleep deprivation and the EEG in n	378
Periodicity analysis - a potential tool for biometeorologist/	11
peripheral auditory apparatus/Temperature effects on the	119
peripheral cutaneous unmyelinated fibers/Response of single dorsal cord	189
peripheral shock by hypothalamic stimulation/Attenuation of aversive pro	130
Peripheral versus central mechanisms in the conditioning of ectopic arrh	74
person on heart rate in monkeys/The effect of	195
(pharmacology)Remarks on LSD/	340
phase diagrams of oral temperature and urinary functions in a healthy man	270
Phase difference tests - longitudinal and transverse - on circadian rhyt	223
phenomena in phospholipid mono-molecular films/A demonstration of ion-ex	320
philosophy of languages/The	171
philosophy of languages/The	283
(philosophy)Why-questions/	250
Phonemic similarity and interference in short-term memory for single let	353
phonemic similarity of retroactive interference/Short-term recognition m	354
phonemically similar lists/Short-term memory for	237
phonological theory/Some controversial questions in	116
(phonology)Some controversial questions in phonological theory/	116
phospholipid mono-molecular films/A demonstration of ion-exchange phenom	320
photic stimulation/Facilitation and inhibition in the visual system afte	114
photically evoked cerebral responses in man/Functional relations between	232
photoperiodic clock/The circadian oscillation in Drosophila pseudoobscur	313
Photoreceptor latency, adaptation level and metacontrast/	317
phrase structure grammars/A note on asymmetry in	62
physical basis of life and learning/The	208
Physics and biology-where do they meet?/	321
physiologic and pathologic responses, including injury and death/Organis	46
physiologic circadian crests in groups of children studies "transversely	268
Physiologic rhythms and bioastronautics/	48
physiological change: a comparative approach to the experimental analys	24
Physiological factors in decompression sickness/	123
Physiological observations of auditory masking. Effect of masking inten	29
Physiological rhythms/	47
(physiology)Cardiovascular responses to novel and conditional stimuli ev	191
(physiology)Central nervous system: motor mechanisms/	376

(physiology)Responses of single units in the auditory cortex/	44
pictorial noise/The subjective effect of two-dimensional	167
picture coding/Digital	280
pictures/Coding color	45
picture transmission/PCM	164
pigeon/A stereotaxic atlas of the brain of the	386
pigeon/Brightness and pattern discrimination deficits after lesions of	277
pigeon (Columbia livia)/Projections of optic tectum of the	170
pigeon/Some discriminative properties of fixed-ratio performance in the	403
pinnal mitosis of starving, dehydrated C mice/Circadian rhythmic pituit	151
pituitary-adrenal axis during rapid eye movement sleep in man/Activatio	296
pituitary-adrenal axis in man/Rhinencephalic regulation of the	419
pituitary adrenocorticotrophic activity, rectal temperature and pinnal m	151
pituitary adrenocorticotrophic rhythm in C mice/Effect of cerebral ablat	144
planarians/Evidence of right-left discrimination in	30
planarians/Retention of a discrimination following regeneration in	257
planarians reliably/Failure to train	22
Plasticity in sensorimotor systems/	156
polynomial equations by elimination/Solution of systems of	300
positive and negative reinforcing neural systems/Interaction of	92
postnatal neurogenesis/Autoradiographic and histological studies of	248
Postnatal origin of microneurons in the rat brain/	97
potential reinforcements during the 'warning stimulus'/Rate change effec	15
potentials in cat/Hypertonic urea: its effects on cortical and subcorti	401
potentials in multiple unit studies/The real-time sorting of neuro-elect	214
potentiation of insulin coma by saccharin/The	230
power density spectrum of television random noise/The	165
Preface to A.R. Luria: Higher cortical functions in man /	339
preference in the chimpanzee/Strategies of schedule	278
pre-schedule change stimulus/Rate change effects during a	1
prefiltering in sampled data with read-in jitter/Optimum	180
preoptic area in monkey/Ejaculation evoked by stimulation of the	319
preparation suitable for chronic electrophysiological, biochemical and b	129
preschool through first grade/Syntactic rules used by children from	66
pressure and heart rate changes in dogs during hypothalamic self-stimula	196
pressure and heart rate changes during sinus arrhythmia/Blood	194
pressure in CBA mice as related to age/Arterial	161
pressure changes during two beat sinus arrhythmia/Systolic blood	75
pressure response to social stress/Role of early experience in determini	417
pressure transformation by the head and auditory meatus of the cat/On th	355
pressures in unanesthetized dogs using the ring-catheter techniques/Chro	310
Presynaptic hyperpolarization: A role for fine afferent fibres/	63
primary auditory neurons/Some implications of the stochastic behavior of	213
(primate)A note on time out from avoidance with the chimpanzee/	136
(primate)Arithmetic behavior in chimpanzees/	38
(primate)Aspects of the delayed alternation deficits produced by electri	147
(primate)Facilitation of large ratio performance by use of conditioned r	137
primate flight/Analysis of brain wave records from Gemini flight GT-7 an	358
primate flight/Central, nervous, cardiovascular and visuomotor studies r	414
(primate)The effect of person on heart rate in monkeys/	195
primates/Some behavioral consequences of frontal-lobe lesions in rodents	341
primates to receive drug injections/A method for training unrestrained	60
probabilistic coding/Modulation and demodulation for	356
Probabilities with spike discharges in auditory nerve fibers/	146
probability generating station/Acentral	157
problem of the reticular formation/Introduction to the	291
problem with sequential decoding/The computation	203

problems/Behavior stress and physiological change: A comparative apprao	24
problems/Distributed solution of network programming	31
problems in central nervous monitoring in performing subjects/Electrode	385
Problems of measurement and interpretation with reinforcing brain stimul	90
problems to be attacked with a series of U.S. satellites in 1966/On the	201
processes/Bounds on the accuracy attainable in the estimation of continu	348
Processing and transmitting information through the central nervous syst	155
processing mechanisms/Macromolecular conformation changes as possible in	18
profiles of rhythms/Some aspects of biologic data analysis; longitudina	149
program/Word-recognition computer	265
programmed environment/Detecting and recording the behavior of animals i	9
Programmed environments for the experimental analysis of behavior/	262
programmed experimental environment/A long-term study of human performan	10
programming/A pulser device for automatic	7
programming of two animals in a single experimental space/A combination	39
Projections of optic tectum of the pigeon (<i>Columba livia</i>)/	170
propagation of the nervous impulse down medullated and unmedullated fiber	312
properties of BaTiO ₃ single crystals/Some dielectric and electro-optic	169
properties of lanthanum on cell membrane/Staining	132
properties of long durations of rewarding brain stimulation/Motivational	162
properties of peripheral shock by hypothalamic stimulation/Attenuation o	130
properties of RC and RL driving-point impedance functions/Some mapping	166
protein and nucleic acid metabolism of the brain/Autoradiographic examin	245
protein/Chemical, structural and immunological studies of nerve axon	84
protein in neural function/Role of	210
proteins: functional correlates/Brain and nerve	209
Pseudorandom scanning/	54
psychic memory/Immunologic and	16
psychoendocrine system/Emotion and the sensitivity of the	364
psychological reality of linguistic segments/The	140
psychophysical change: A comparative approach to the experimental analy	25
Psychophysiology of emotional behavior/	2
psychosomatic disorders/Instrumental behavior and psychophysiological ch	25
psychosomatic hypothesis/Enzyme induction and the	183
psychosomatic problems/Behavior stress and physiological change: A comp	24
pulser device for automatic programming/A	7
punished and non-punished behavior by stimulus change/Disruption of	306
punishment with continuous reinforcement/Fixed-ratio	52
punishment situation/Simulated gravity (2g): the aversive stimulus in a	393
pupae: a model for the photoperiodic clock/The circadian oscillation in	313
pupil response during binocular rivalry/Attenuation of	316
pyelonephritis/The renal lymphatics and therapy of	121
pyelonephritis/Significance of antibacterial levels in the renal lymph d	256
Quantitative neuroanatomic studies implemented by ultrasonic lesions - m	40
quantitative organization/Mammillary complex of cat brain - aspects of	263
quantization of stationary signals/On the optimum	28
quantization/Optimum	112
questions/Why-	250
Questions/	365
questions of reference/Mr. Pfeiffer on	387
(radiation)The effect of megavoltage, total body irradiation on experime	122
radiorenography for evaluating renal ischemia/Experimental basis of quan	373
random interval schedules/The generation of	118
random noise/The power density spectrum of television	165
random processes/Bounds on the accuracy attainable in the estimation of	348

rat brain/Postnatal origin of microneurons in the	97
(rat)Continuous opportunity for reinforcing brain stimulation/	91
rat/Dendritic fields of retinal ganglion cells of the	110
(rat)Independence of approach and escape reactions to electrical stimula	229
rat kept in continuous light of 30 lux intensity/Reproducibility of circ	382
Rat retinal ganglion cells: receptive field organization and maintained	111
rate and instrumental avoidance behavior in the rhesus monkey/Concurrent	14
Rate change effects during a pre-schedule change stimulus/	1
Rate change effects with equal potential reinforcements during the 'warn	15
rate-distortion bounds/A comparison of optimum angle modulation system a	231
Rate of intracranial self-stimulation as a function of reinforcement mag	19
ratio schedule/Time out from a fixed	222
rats: alternation and Hebb-Williams maze performance/Caudate, cortical	148
Rat's anticipation of diurnal and a-diurnal feeding/	108
rats at altitude/Urinary bladder calculi formed in	124
rat's diurnal activity cycle/Effects of adiurnal lighting and feeding on	249
rats/Extraction and bioassay of renin from kidneys of sodium-depleted an	371
rat's home cage behavior/Effects of deprivation conditions upon the	107
rats in operant conditioning studies/A device for the partial restraint	269
rats maintained a-periodically/Consummatory behavior in	106
rats: T-maze learning for food/Lateral hypothalamic stimulation in sati	190
RC and RL driving-point impedance functions/Some mapping properties of	166
reactions to electrical stimulation of the brain/Independence of approac	229
Reading and talking bilingually/	287
Reading temporally and spatially transformed text/	389
read-in-jitter/Optimum prefiltering in sampled data with	180
readout in biological systems/Chemical means of information storage and	35
real-time sorting of neuro-electric action potentials in multiple unit s	214
receptive field organization and maintained activity/Rat retinal ganglio	111
recognition memory for normal and whispered letters/Short-term	238
recognition memory for single digits and pairs of digits/Short-term	239
recognition of connected handwritten words/Experiments on computer	67
recording the behavior of animals in a multi-enclosure programmed enviro	9
rectal temperature and pinnal mitosis of starving, dehydrated C mice/Cir	151
rectal temperature) of one healthy female adult before during and after	315
recurrent codes/Note on	23
re-examination of "prolonged retrograde amnesia" in one-trial learning/A	255
reference library/Technical details of data acquisition for the normativ	172
reference library/The normative electroencephalographic data	186
reference/Mr. Pfeiffer on questions of	387
reflexes/Attitudinal	226
reflexes/The cardiodynamics of cardiac conditional	309
reflexes/The effect of cardiac arrest with closed chest massage on class	27
reflux - the physician's dilemma/Urinary	366
regeneration in planarians/Retention of a discrimination following	257
Regeneration of retention of acquired information/	427
reinforcement/Facilitation of large ratio performance by use of conditio	137
reinforcement/Fixed-ratio punishment with continuous	52
reinforcement magnitude and density/Rate of intracranial self-stimulatio	19
reinforcement/The locus of	408
reinforcement/Timing behavior as a function of amount of	103
reinforcement/Variables determining the effects of delay in	135
reinforcements during the 'warning stimulus'/Rate change effects with eq	15
reinforcing brain stimulation/Continuous opportunity for	91
reinforcing brain stimulation/Problems of measurement and interpretation	90
reinforcing brain stimulation/The effects of mesencephalic central grey	238
reinforcing brain stimulation/The medial forebrain bundle-lateral hypoth	346

reinforcing neural systems/Interaction of positive and negative	92
reinforcing stimuli/Enhancement of fixed-ratio performance by briefly pr	344
Reinforcing value of information/	158
relations between stimulus intensity and photically evoked cerebral resp	232
Relationships of neuronal spike populations and EEG activity in chronic	251
renal ischemia/Experimental basis of quantitative radiorenography for ev	373
renal ischemic hypertension/Measurement of oxygen tension and saturation	120
renal lymph during treatment of pyelonephritis/Significance of antibacte	256
renal lymph oxygen tension during graded renal ischemia/	369
Renal lymphatics: an active fluid transport system/	367
renal lymphatics and therapy of pyelonephritis/The	121
renal lymphatics/Transport of renin-angiotension by	125
Renal scan: the test of choice in renal trauma/	388
renal secretion collected by the ureteral-shunt method/The effect of nov	398
renin-angiotension by renal lymphatics/Transport of	125
renin/A simplified method for the extraction and bioassay of	284
renin from kidneys of sodium-depleted and sodium-loaded rats/Extraction	371
repertoires/An experimental outline for building and exploring multi-ope	4
repertoires under continuous environmental control/Experimental analysis	26
repetitive stimulus/Control of temporally spaced responding by a	225
requirements/Analysis of baseline and Gemini flight GT-7 data with speci	244
research/A multiuser computation facility for education and	32
Research in demyelinating diseases/	42
research symposium summaries/Neurosciences	330
Resistance of an N-dimensional cube/	224
resolution of low-frequency, small-amplitude rhythms in excreted ketoste	150
respiratory components of conditional catalepsy to bulboapnine/Cardio-	397
responding by a repetitive stimulus/Control of temporally spaced	225
responding in second order schedules/Stimulus control of temporally spac	407
response during binocular rivalry/Attenuation of pupil	316
Response of single dorsal cord cells to peripheral cutaneous unmyelinate	189
response of the bullfrog/The evoked vocal	113
response patterns during temporally spaced responding/Complex	21
response patterns of spike discharges for units in the cochlear nucleus:	311
responses/A method for analyzing variations in evoked	252
responses: dependence on acoustic stimulus parameters/Efferent inhibiti	412
responses from the auditory cortex/Evoked	89
responses, including injury and death/Organisms as circadian systems; te	46
responses in limulus/Test of cross-optic transfer of habituated	372
responses in man/Functional relations between stimulus intensity and pho	232
responses in relation to temporal conditioning to paired stimuli in man/	360
responses/Intrinsic organization of cerebral tissue in alerting, orienti	415
Responses of single units in the auditory cortex/	44
Responses to acoustic stimuli from single units in the eighth nerve of t	81
responses to limbic stimulation in man: localization of stimulus sites	323
responses to reinforcing brain stimulation/The effects of mesencephalic	258
responses to simulated weightlessness induced by the Nogravatron, a two	279
response to social stress/Role of early experience in determining the bl	417
restraint of rats in operant conditioning studies/A device for the parti	248
restriction/Neurophysiological effects of early sensory	187
results on binaural unmasking and the EC model/Further	314
retention of acquired information/Regeneration of	427
Retention of a discrimination following regeneration in planarians/	257
reticular formation/Introduction to the problem of the	291
reticular formation/Towards a theory of the	58
retina-cortex connections and DNA coding/On	79
retinal ganglion cells of the rat/Dendritic fields of	110

retinal ganglion cells: receptive field organization and maintained act	111
retrograde amnesia" in one-trial learning/A re-examination of "prolonged	255
review: cerebral localization and organization/Book	227
Review of J. Carroll's "Language and Thought"/	139
revisions of the classical views of agnosia/Some needed	221
rewarding brain stimulation/Motivational properties of long durations of	162
rhesus monkey/Concurrent measurement of heart rate and instrumental avoi	14
Rhinencephalic regulation of the pituitary-adrenal axis in man/	419
rhythm in C mice/Effect of cerebral ablation on a circadian pituitary ad	144
rhythm in hepatic glycogen of mice during inanition and dehydration/Pers	271
rhythm in the rat kept in continuous light of 30 lux intensity/Reproduci	382
rhythm of chickens with alternating sleepwakefulness and of the estimati	153
(rhythm of the rectal temperature) of one healthy female adult before, d	315
rhythm with low amplitude in human blood/Cosinor-evaluation of circadian	267
Rhythms and bioastronautics/Physiologic	48
rhythms/Computer techniques in the study of biologic	49
rhythms/Electronic computer techniques for the study of endocrine	152
rhythms for space flight/Significance of circadian	100
rhythms in a cockroach gauged by variance spectra/Oxygen uptake	77
rhythms in data at equal or unequal intervals/Spectral analysis of stero	36
rhythms in excreted ketosteroid; probable androgen-induced circaseptan d	150
rhythms in human cancer, reevaluated by electronic computer programs - e	379
rhythms in man/Circadian	99
rhythms of C mice/Phase difference tests - longitudinal and transverse on	223
rhythms of hibernators/The internal	423
rhythms/Physiological	47
rhythms/Some aspects of biologic data analysis; longitudinal and transv	149
rhythms, space research and manned space flight/Circadian	402
right-left discrimination in planarians/Evidence of	30
ring-catheter technique/Chronic basal blood pressures in unanesthetized	310
rivalry/Attenuation of pupil response during binocular	316
R, + L, +C, T networks/Bounds on impedance functions of	168
RL driving-point impedance functions/Some mapping properties of RC and	166
r_m ?/Could meaning be an	138
rocket/Development of a small animal payload and integration with a soun	418
(rodent)Arterial pressure in CBA mice as related to age/	161
(rodent)Caudate, cortical, hippocampal and dorsal thalamic lesions in ra	148
(rodent)Circadian rhythmic pituitary adrenocorticotrophic activity, recta	151
(rodent)Consummatory behavior in rats maintained a-periodically/	106
(rodent)Curiosity in the hamster/	211
(rodent)Dendritic fields of retinal ganglion cells of the rat/	110
(rodent)Effect of cerebral ablation on a circadian pituitary adrenocorti	144
(rodent)Effects of deprivation conditions upon the rat's home cage behav	107
(rodent)Independance of approach and escape reactions to electrical stim	229
(rodent)Lateral hypothalamic stimulation in satiated rats: T-maze learn	190
(rodent)Phase difference tests - longitudinal and transverse - on circad	223
(rodent)Rat retinal ganglion cells: receptive field organization and ma	111
(rodent)Rat's anticipation of diurnal and a-diurnal feeding/	108
(rodent)Postnatal origin of microneurons in the rat brain/	97
(rodent)Urinary bladder calculi formed in rats at altitude/	124
rodents, carnivores and primates/Some behavioral consequences of frontal	341
role for fine afferent fibres/Presynaptic hyperpolarization: A	63
role of water structures in the molecular organization of cell membranes	51
rotation apparatus/An investigation of barley seedling growth responses	279
rotundus in the pigeon/Brightness and pattern discrimination deficits af	277
rules in children's grammar/Alternation of	64
rules used by children from preschool through first grade/Syntactic	66

saccharin/The potentiation of insulin coma by	230
sampled data with read-in jitter/Optimum prefiltering in	180
sample performance/Stimulus change effects on matching to	336
satellites in 1966/On the biological problems to be attacked with a seri	201
saturation in the diagnosis of renal ischemic hypertension/Measurement o	120
scanning/Pseudorandom	54
schedule preference in the chimpanzee/Strategies of	278
schedule/Time out from a fixed ratio	222
schedules/Observing behavior during interval	274
schedules/Stimulus control of temporally spaced responding in second-ord	407
schedules/The generation of random interval	118
second-order schedules/Stimulus control of temporally spaced responding	407
seedling growth responses to simulated weightlessness induced by the Nog	279
segmental and supraspinal interaction with a dorsolateral spinal cutaneo	88
segments/The psychological reality of linguistic	140
Self-induction and memory/	80
self-stimulation as a function of reinforcement magnitude and density/Ra	19
Semantic theory and the meaning of 'good'/	56
(semantics)Could meaning be an r_m ?/	138
sensitivity of the psychoendocrine system/Emotion and the	364
sensorimotor coordination/Plasticity in	272
sensorimotor systems/Plasticity in	156
(sensory deprivation)Thermic spectrum (rhythm of the rectal temperature)	315
sensory messages and functions of different states of wakefulness and sl	127
sensory restriction/Neurophysiological effects of early	187
sensory status in congenital encephalopathy/Unusual	324
sequential decoding/An experimental facility for	192
sequential decoding/The computation problem with	203
Sequential measurement of multidimensional transducers/	85
sequentially presented letters and words/Naming	288
shock by hypothalamic stimulation/Attenuation of aversive properties of	130
short-term memory/Acoustic similarity and intrusion errors in	235
short-term memory for English vowels/Distinctive features and errors in	236
Short-term memory for phonemically similar lists/	237
short-term memory for single letters/Phonemic similarity and interferenc	353
short-term memory/Interlingual facilitation of	286
Short-term recognition memory for normal and whispered letters/	238
Short-term recognition memory for single digits and pairs of digits/	239
short-term storage of information in vision/Note on	34
signal energy/Minimizing the maximum	281
signals/Experimental studies of hand-writing	292
signals/On the optimum quantization of stationary	28
similarity and interference in short-term memory for single letters/Phon	353
similarity and intrusion errors in short-term memory/Acoustic	235
Similarity and intrusions in short-term memory for consonant vowel diagr	240
simple electronic method for graphing EEG sleep patterns/A	299
Simulated gravity (2g): the aversive stimulus in an instrumental escape	393
simulated congestive heart failure/Transport of sodium by the lymphatics	368
simulated gravity/Animal behavior in fields of	390
series analysis of neurophysiological data/Concepts of cerebral organiza	95
simulated weightlessness induced by the Nogravatron, a two axis rotation	279
simulations/Biosatellite performance	94
single units in the auditory cortex/Responses of	44
sinus arrhythmia/Blood pressure and heart rate changes during	194
Sinus arrhythmia during panting/	197

sinus arrhythmia/Systolic blood pressure changes during two beat	75
sleep and mental states/The cooperative behavior of neuronal population	243
sleep and wakefulness in monkeys/Effect of inter-hemispheric transectio	363
sleep/Biochemical aspects of rapid eye movement	182
sleep deprivation and the EEG in normal men/Circadian periodicity, adre	378
sleep in animals/Matters relating to the state of	242
sleep in man/Activation of the pituitary-adrenal axis during rapid eye	296
sleep in man/Urinary excretion of 3-methoxy-4-hydroxymandelic acid durin	293
sleep in man/Urine volume and osmolarity changes during dreaming	294
sleep patterns/A simple electronic method for graphing EEG	299
sleep/Variations on the transmission of sensory messages and functions	127
sleepwakefulness and of the estimation of time by a young adult man duri	153
Sleep, wakefulness, dreams and memory/	302
small-amplitude rhythms in excreted ketosteroid; probable androgen-indu	150
smell/Speculations on	391
SNR and performance index of filters for waveform estimation/Generalized	96
social stress/Role of early experience in determining the blood pressure	417
sodium by the lymphatics in simulated congestive heart failure/Transport	368
solid state timer/Another	87
solution of network programming problems/Distributed	31
sorting of neuro-electric action potentials in multiple unit studies/The	214
sound pressure transformation by the head and auditory meatus of the cat	355
spaced responding by a repetitive stimulus/Control of temporally	225
space flight/Circadian rhythm, space research and manned	402
space flight conditions of accelerations)/(On the behavior of small anim	21
(space flight)On the biological problems to be attacked with a series of	201
space flight/Significance of circadian rhythms for	100
space research and manned space flight/Circadian rhythms	402
space travel/The behavior of small animals under the accelerative condit	20
spatial discrimination in the temporal and nasal sectors of the monocula	241
specific human brain lesions and memory changes/Correlations between	72
Specificity in the neurosciences/	234
Spectral analysis of steroid rhythms in data at equal or unequal interva	36
Spectral resolution of low-frequency, small-amplitude rhythms in excrete	150
spectra of corticosteroid in adrenal venous effluent of dogs/Variance	43
spectra/Oxygen uptake rhythms in a cockroach gauged by variance	77
spectrum of television random noise/The power density	165
spectrum (rhythm of the rectal temperature) of one healthy female adult	315
spectrum/The spinocervical tract: dorsal-column linkage, conduction vel	218
speech/Comparison of grammar of children with functionally deviant and n	65
speech perception/The active use of grammar in	264
(speech)Some controversial questions in phonological theory/	116
spike discharge from single units in the cochlear nucleus after destruct	285
spike discharges for units in the cochlear nucleus; tone-burst stimulat	311
spike discharges in auditory nerve fibers/Effect of acoustic stimuli on	175
spike discharges in auditory nerve fibers/Probabilities with	146
spike population and EEG activity in chronic cats/Relationships of neuro	251
spike potentials/Anteroventral cochlear nucleus; waveforms of extracell	400
spinal cutaneous, afferent system/Local, segmental and supraspinal inter	88
spinocervical tract: dorsal-column linkage conduction velocity, primary	218
Spontaneous spike discharge from single units in the cochlear nucleus af	285
spontaneous spike discharges in auditory nerve fibers/Effect of acoustic	175
Staining properties of lanthanum on cell membrane/	132
station/Acentral probability generating	157
stationary signals/On the optimum quantization of	28
statistical analysis of electrophysiological data from auditory nerve fi	266
Statistics of switching-time jitter for a tunnel diode/	305

status in congenital encephalopathy/Unusual sensory	324
stem/The isodendritic core of the brain	304
steroid rhythms in data at equal or unequal intervals/Spectral analysis	36
steroids and alpha frequency in the EEG: a demonstration/Daily correla	301
stimulated activity in the cochlear nucleus of anesthetized cats/Spike	199
stimulation as an unconditional stimulus/An attempt to condition extras	399
stimulation as an unconditional stimulus/Electrocardiographic condition	13
stimulation/Attenuation of aversive properties of peripheral shock by h	130
stimulation/Blood pressure and heart rate changes in dogs during hypothal	196
stimulation/Brain	384
stimulation/Classification of response patterns of spike discharges for	311
stimulation/Facilitation and inhibition in the visual system after photi	114
stimulation in man: localization of stimulus sites/Corticosteroid respo	323
stimulation in satiated rats: T-maze learning for food/Lateral hypothal	190
stimulation/Motivational properties of long durations of rewarding brain	162
stimulation of the brain/Independence of approach and escape reactions t	229
stimulation of the preoptic area in monkey/Ejaculation evoked by	319
stimulation on monkeys/Aspects of the delayed alternation deficits produ	147
stimulation/Problems of measurement and interpretation with reinforcing	90
stimulation/The effects of mesencephalic central grey lesions on respons	258
stimulation/The medial forebrain bundle-lateral hypothalamic area and re	346
stimuli/Enhancement of fixed-ratio performance by briefly presented cond	344
stimuli evaluated by successive beat/Cardiovascular responses to novel a	191
stimuli/Forward and backward masking as a function of relative overlap an	325
stimuli from single units in the eighth nerve of the green frog/Response	81
stimuli in man/Some observations on evoked responses in relation to temp	360
stimuli/Minimum detectable change in interaural time or intensity differ	50
stimuli on renal secretion collected by the ureteral-shunt method/The ef	398
stimuli on spontaneous spike discharges in auditory nerve fibers/Effect	175
stimulus/An attempt to condition extrasystoles using direct myocardial e	399
stimulus change/Disruption of punished and non-punished behavior by	306
Stimulus change effects on matching to sample performance/	336
Stimulus coding in the auditory nerve and cochlear nucleus/	173
Stimulus coding the cochlear nucleus/	174
stimulus/Control of temporally spaced responding by a repetitive	225
Stimulus control of temporally spaced responding in second-order schedul	407
stimulus duration/Discrimination of hefted weights; effect of	212
stimulus/Electrocardiographic conditioning with hypothalamic stimulation	13
(stimulus)Fixed-ratio punishment with continuous reinforcement/	52
stimulus generalization/Effects of averaging data	68
stimulus in an instrumental escape and punishment situation/Simulated gr	393
stimulus intensity and photically evoked cerebral responses in man/Funct	232
stimulus parameters/Efferent inhibition of auditory nerve responses: dep	412
stimulus/Rate change effects during a pre-schedule change	1
stimulus'/Rate change effects with equal potential reinforcements during	15
stimulus sites/Corticosteroid responses to limbic stimulation in man: lo	323
stochastic behavior of primary auditory neurons/Some implications of the	213
storage and low-temperature biology/Memory	70
storage and readout in biological systems/Chemical means of information	35
storage of information in vision/Note on short-term	34
strange systems/New and	329
stress and physiological change: a comparative approach to the experime	24
stress of dreaming/The	392
stress/Role of early experience in determining the blood pressure respon	417
structural, and immunological studies of nerve axon protein/Chemical	84
structure grammars/A note on asymmetry in phrase	62
structure of English language/Analysis of the	424

structures and functions related to memory/Some brain	71
structures in the molecular organization of cell membranes/The role of w	51
structures/Methods for completely deciphering the neuronal circuitry of	143
studies/A device for the partial restraint of rats in operant conditioni	269
studies implemented by ultrasonic lesions - mammillary nuclei and associ	40
studies of auditory discrimination/Experimental	420
studies of handwriting signals/Experimental	292
studies of nerve axon protein/Chemical, structural, and immunological	84
studies of neurons in aplysia/Prolonged in vitro culture and autoradiogr	335
studies of postnatal neurogenesis/Autoradiographic and histological	248
studies of sex hormones/Autoradiographic and implantation	198
studies relating to spatial orientation in a 30 day primate flight/Centr	414
studies/The real-time sorting of neuro-electric action potentials in mul	214
study/An arthropod preparation suitable for chronic electrophysiological	129
study/Mood, motility, and 17-hydroxycorticoid excretion: polyvariable c	331
study of biologic rhythms/Computer techniques in the	49
study of endocrine rhythms/Electronic computer techniques for the	152
study of four subjects/Discriminating among states of consciousness by EE	410
study of misspelled words in "developmental dysgraphia"/Serial order in	289
study of the circadian rhythm of chickens with alternating sleepwakefuln	153
study of the performance of linear and nonlinear filters/A	17
study of two healthy adult subjects before, during and after their isola	332
study of visual-oculomotor processes with the aid of oriental ideograms/	361
subcortical evoked potentials in cat/Hypertonic urea: its effects on co	401
subjective effect of two-dimensional pictorial noise/The	167
SU-4885 in mice/Circadian system-phase dependent toxicity and other effe	37
Summation: Convergence, divergences, lacunae/	342
superior-olivary nucleus of the cat/Binaural interaction in the accessor	154
Superposition in a class of nonlinear systems/	73
Superposition in a class of nonlinear systems/	193
Superstitious chaining during temporal discrimination/	307
suppression/Alleviation of conditioned	159
suppression/The effect of discrimination training on generalization of c	275
Supramolecular organization of enzyme and membrane systems/	179
supraspinal interaction with a dorsolateral spinal cutaneous afferent sy	88
switching-time jitter for a tunnel diode/Statistics of	305
symposium summaries/Neurosciences research	330
synapse as a cybernetic unit: a biochemist's fantasy/The	78
synapse: Morphological and chemical correlates of function/The	202
Syntactic rules used by children from preschool through first grade/	66
syntax: a critique of "contextual generalization"/On the acquisition of	104
syntax/Aspects of the theory of	115
syntax/Hidatsa	185
Synthesis of a class of nonlinear systems/	206
synthesis of nonlinear systems/Some techniques for the	253
Synthesizing the components of arithmetic behavior/	261
system after photic stimulation/Facilitation and inhibition in the visua	114
system/A model of the peripheral auditory	411
system for low-frequency bioelectric signals/A simple time-division mult	362
system function/Mathematical concepts of central nervous	216
system/Local, segmental and supraspinal interaction with a dorsolateral	88
system/Measurement of the Wiener kernels of a non-linear	178
system of finite order/Measurement of the kernels of a nonlinear	205
system-phase dependent toxicity and other effects of SU-4885 in mice/Cir	37
system/Processing and transmitting information through the central nervo	155
system/The organization of memory functions in the vertebrate nervous	134
systems and rate-distortion bounds/A comparison of optimum angle modulat	231

systems/A new model of alimentary	318
systems characterized by nonlinear differential equation/Functional anal	308
systems/Chemical means of information storage and readout in biological	35
systems/Interaction of positive and negative reinforcing neural	92
systems for generalized error criteria based on the use of gate function	204
systems/New and strange	329
systems of polynomial equations by elimination/Solution of	300
systems/Plasticity in sensorimotor	156
systems/Some aspects of the Wiener theory of nonlinear	177
systems/Some techniques for the synthesis of nonlinear	253
systems/Superposition in a class of nonlinear	73
systems/Superposition in a class of nonlinear	193
systems/Supramolecular organization of enzyme and membrane	179
systems/Synthesis of a class of nonlinear	206
systems; temporal analysis of their physiologic and pathologic response	46
Systolic blood pressure changes during two beat sinus arrhythmia/	75
tactile and visual functions/Disorders of	219
Tactually-guided maze learning in man: effects of unilateral cortical e	128
talking bilingually/Reading and	287
Taxonomies of disease/	375
teaching of English/On the role of linguistics in the	404
Technical details of data acquisition for the normative electroencephalo	172
technique/Chronic basal blood pressures in unanesthetized dogs using the	310
techniques for the study of endocrine rhythms/Electronic computer	152
Techniques for the synthesis of nonlinear system/	253
techniques in the study of biologic rhythms/Computer	49
tectum of the pigeon (<i>Columba livia</i>)/Projections of optic	170
television random noise/The power density spectrum of	165
temperature and pinnal mitosis of starving, dehydrated C mice/Circadian	151
temperature and urinary functions in a healthy man studies longitudinall	270
Temperature effects on the peripheral auditory apparatus/	119
temperature) of one healthy female adult before, during and after her is	315
temperature rhythm in the rat kept in continuous light of 30 lux intensi	382
temporal analysis of their physiologic and pathologic responses, includi	46
temporal and nasal sectors of the monocular visual field/Comparison of s	241
temporal conditioning to paired stimuli in man/Some observations on evok	360
temporal discrimination/Superstitious chaining during	307
temporal morphology; procedures and illustrative examples/Circadian sys	383
temporal pathology - an analogy to microscopy/Resolving power of electro	381
temporally spaced responding and avoidance behavior/Electroencephalograp	6
temporally spaced responding by a repetitive stimulus/Control of	225
temporally spaced responding/Complex response patterns during	5
temporally spaced responding in second-order schedules/Stimulus control	407
tension and saturation in the diagnosis of renal ischemic hypertension/M	120
test and masking stimuli/Forward and backward masking as a function of r	325
test of choice in renal trauma/Renal scan: The	388
tests - longitudinal and transverse - on circadian rhythms of C mice/Pha	223
texts/Catawba	395
thalamic lesions in rats: alternation and Hebb-Williams maze performanc	148
therapy of pyelonephritis/The renal lymphatics and	121
theorem and some applications/A simple derivation of the coding	145
theory and the meaning of 'good'/Semantic	56
theory of linguistic description/An integrated theory	57
theory of nonlinear systems/Some aspects of the Wiener	177
theory of passive ion flux through axon membranes/A	59
theory of syntax/Aspects of the	115

theory of the reticular formation/Towards a	58
theory/Pain mechanisms: a new	188
theory/Some controversial questions in phonological	116
thermic spectrum (rhythm of the rectal temperature) of one healthy femal	315
Thought"/Review of J. Carroll's "Language and	139
(3H) leucine by the brain/Behavioral influences on the utilization of	246
3 methoxy-4-hydroxymandelic acid during dreaming sleep in man/Urinary ex	293
threshold/Effect of very low frequency tones on auditory	282
time by a young adult man during the two months of staying underground/B	153
time-division multiplexing system for low-frequency bioelectric signals/	362
time estimations with special reference to 24-hour synchronized circadia	217
time-intensity relations in binaural unmasking/	126
time of intensity difference for brief impulsive stimuli/Minimum detecta	50
Time out from a fixed ratio schedule/	222
time out from avoidance with the chimpanzee/A note on	136
time series analysis of neurophysiological data/Concepts of cerebral org	95
time-varying channels/Analog communication over randomly	347
timer/Another solid state	87
Timing behavior and conditioned fear/	69
Timing behavior as a function of amount of reinforcement/	103
tissue in alerting, orienting and discriminative responses/Intrinsic org	415
tissue in transaction and storage of information/The organization of cer	357
tissue/Neurophysiological correlates of information transaction and stor	416
T-maze learning for food/Lateral hypothalamic stimulation in satiated ra	190
T networks/Bounds on impedance functions of R, +L, +C	168
tone-burst stimulation/Classification of response patterns of spike disc	311
tones on auditory threshold/Effect of very low frequency	282
tool for biometeorologists/Periodicity analysis - a potential	11
toxicity and other effects of SU-4885 in mice/Circadian system-phase dep	37
tract: dorsal-column linkage, conduction velocity, primary velocity, pr	218
training on generalization of conditioned suppression/The effect of disc	275
training unrestrained primates to receive drug injections/A method for	60
train planarians reliably/Failure to	22
Transamidinase activity in mouse kidney - an aspect of circadian periodi	93
transducers/Sequential measurement of multidimensional	85
Transfer of habituation using spreading depression/	334
transformed text/Reading temporally and spatially	389
transmission of sensory messages and functions of different states of wa	127
transmission/PCM picture	164
transmitting information through the central nervous-system/Processing a	155
transverse - on circadian rhythms of C mice/Phase difference tests - lon	223
transverse profiles of rhythms/Some aspects of biologic data analysis; 1	149
treatment of pyelonephritis/Significance of antibacterial levels in the	256
tremor relationships in man/Correlation analysis of EEG	359
tryptophan turnover along induceable pathways in man/ACTH induced increa	295
tubes at high Knudson numbers/Angular distribution of flow from orifices	428
tungsten microelectrodes/Glass-coated	101
tunnel diode/Statistics of switching-time jitter for	305
turing machine computations / One-tape, off-line	160
turing machine computations/On line	276
two-dimensional pictorial noise/The subjective effect of	167
two-element-kind impedance functions/Bounds on	163
Two-way languages/	394
typology: comparative comments on the development of a scientific theme	409
ultrasonic lesions - mammillary nuclei and associated complex of cat bra	40
ultrastructural correlates of function in neurons, neuronal nets, and th	327

unconditional stimulus/An attempt to condition extra-systoles using direct	399
unconditional stimulus/Electrocardiographic conditioning with hypothalam	13
unilateral cortical excisions and bilateral hippocampal lesions/Tactually	128
units in the auditory cortex/Responses of single	44
units in the cochlear nucleus after destruction of the cochlea /Spontaneous	285
unit studies/The real time sorting of neuro-electric action potentials in	214
unmasking and the EC model/Further results on binaural	314
unmasking/Time-intensity relations in binaural	126
unmyelinated fibers/On the propagation of the nervous impulse down medullary	312
unmyelinated fibers/Response of single dorsal cord cells to peripheral cutaneous	189
unrestrained primates to receive drug injections/A method for training	60
uptake of DL-norepinephrine-7- H^3 in the avian brain/Distribution of monoamine	333
urea: its effects on cortical and subcortical evoked potentials in cat/	401
ureteral-shunt method/The effect of novel stimuli on renal secretion of	398
Urinary bladder calculi formed in rats at altitude/	124
Urinary excretion of 3-methoxy-4-hydroxymandelic acid during dreaming and	293
urinary functions in a healthy man studied longitudinally/Circadian phases	270
Urinary LDH (Lactic Dehydrogenase) activity in the diagnosis of urologic	290
Urinary reflux - the physician's dilemma/	366
Urine volume and osmolarity changes during dreaming sleep in man/	294
urologic neoplasms/Urinary LDH (Lactic Dehydrogenase) activity in the digestive	290
U.S. satellites in 1966/On the biological problems to be attacked with a	201
value of information/Reinforcing	158
Variables determining the effects of delay in reinforcement/	135
Variance spectra of corticosteroid in adrenal venous effluent of dogs/	43
variance spectra/Oxygen uptake rhythms in a cockroach gauged by	77
variation of luminance and light-dark ratio/Brightness enhancement in light	352
Variations and abnormalities in motor development/	228
variations in evoked responses/A method for analyzing	252
Variations on the transmission of sensory messages and functions of different	127
velocity, primary velocity, primary afferent spectrum/The spinocervical	218
venous effluent of dogs/Variance spectra of corticosteroid in adrenal	43
vertebrate nervous system/The organization of memory functions in the	134
views of agnosia/Some needed revisions of the classical	221
vision/Effects of occipital lobe lesion on pattern	220
vision/Note on short-term storage of information in	34
visual cliff/Studying depth perception with the	351
visual field/Comparison of spatial discrimination in the temporal and spatial	241
visual functions/Disorders of higher tactile and	219
visual-oculomotor processes with the aid of orienting ideograms/Some possible	361
visual system after photic stimulation/Facilitation and inhibition in the	114
visuomotor studies relating to spatial orientation in a 30 day primate feeding	414
vocal response of the bullfrog/The evoked	113
volume and osmolarity changes during dreaming sleep in man/Urine	294
volume conductor/On bioelectric potentials in an inhomogeneous	380
vowels/Distinctive features and errors in short-term memory for English	236
wakefulness and sleep/Variations on the transmission of sensory messages	127
wakefulness, dreams and memory/Sleep,	302
wakefulness in monkeys/Effect of interhemispheric transection on the EEG	363
'warning stimulus'/Rate change effects with equal potential reinforcement	15
(water loss)Persisting circadian rhythm in hepatic glycogen of mice during	271
water structures in the molecular organization of cell membranes/The role	51
waveform estimation/Generalized SNR and performance index of filters for	96
weightlessness induced by the Nogravatron, a two axis rotation apparatus	279
weights; effect of stimulus duration/Discrimination of hefted	212

whispered letters/Short-term recognition memory for normal and	238
Why-questions/	250
Wiener kernels of a non-linear system by cross-correlating/Measurement o	178
Wiener theory of nonlinear systems/Some aspects of the	177
wines/Perceptual learning and the discrimination of	349
Wittgenstein/Operationalism and ordinary language, a critique of	141
Word-recognition computer program/	265
words/Experiments on computer recognition of connected handwritten	67
words in "developmental dysgraphia"/Serial order in writing: a study of	289
words/Naming sequentially presented letters and	288
writing: a study of misspelled words in "developmental dysgraphia"/Seri	289

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ANALYSIS OF THE PUBLICATION SOURCES

The 428 studies published under the auspices of the Behavioral Biology Program of NASA between 1961 and 1967 are represented by the 16 primary research areas listed in the table on page 80. The categories are arranged in terms of total number of publications, and range from 100 in Neurophysiology to one each in Animal Feeding, Biometeorology, and Physics. For all areas, the greatest number occurred in 1965, when 148 studies were published. A number of reports appeared to fall into more than one category although the various alternatives were closely related fields. In such cases, consideration was given to the journal or book in which it appeared and the orientation of the author(s).

In order to ascertain the trend in the frequency of publications appearing in the primary fields, Figures 1-9 were constructed. These distributions indicate the number of studies published in only the first nine categories of the table, since each of the remaining seven has a total of three or less publications for all years. 1961, 1962, and 1963 were combined for the same reason, i.e., there were only 16 publications during these years. In addition to reports which have already been published, the totals for 1966 include those which are in press. Since the year 1967 is incomplete, it has been omitted from the figures.

Figures 1 (Neurophysiology), 2 (Psychology), 5 (Physiology), 6 (Linguistics and Psycholinguistics), and 8 (Information Science) have rather consistent publication frequencies between 1964 and 1966, whereas Figures 3 (Psychophysiology), 4 (Engineering), 7 (Circadian Rhythms), and 9 (Medicine) show some variability for the same period. The greatest change occurred in Psychology, which dropped from 43.8% in 1961-62-63 to 15.6% in 1964, and in Psychophysiology, which rose from 8.8% in 1965 to 17.9% in 1966.

Each of the primary research areas comprises several subcategories. For example, Neurophysiology included studies in electrophysiology, neurochemistry, memory storage and processing, sensory systems, and neurohistology. Learning, perception, animal behavior, and complex processes are emphasized in Psychology. Psychophysiology consists mainly of learning, emotion, sensation and perception, psychosomatics, and reticular system functions. A good deal of work on cardiovascular and renal problems is found in Physiology, and Information Science covers the fields of programming, coding, and information processing. Finally, most of the research in medicine is concerned with urology.

	In Press									TOTAL
	1961	1962	1963	1964	1965	1966	No Date	1966	1967	
Neurophysiology			3	19	35	24	16	3		100
Psychology	1	3	3	12	24	23	7	1		74
Psychophysiology		2	1	12	13	22	10	2	1	63
Engineering				8	21	10	1	1	1	42
Physiology			1	7	14	12	3	1	1	39
Linguistics and Psycholinguistics				8	15	9	4		1	37
Circadian Rhythms				7	10	6	4	1		28
Information Science	1			4	5	4	1	1	1	17
Medicine					7		9			16
Philosophy						2	1			3
Biology					1	1				2
Biophysics						1	1			2
Mathematics					1	1				2
Animal Feeding				1						1
Biometeorology	1									1
Physics					1					1
TOTAL	3	5	8	77	148	115	57	10	5	428

Table. Number of studies under the NASA Behavioral Biology Program for the years 1961-1967 according to primary research areas.

Graphic Representation of the
Annual Distribution of Publications
in the Subdisciplines of Behavioral Biology

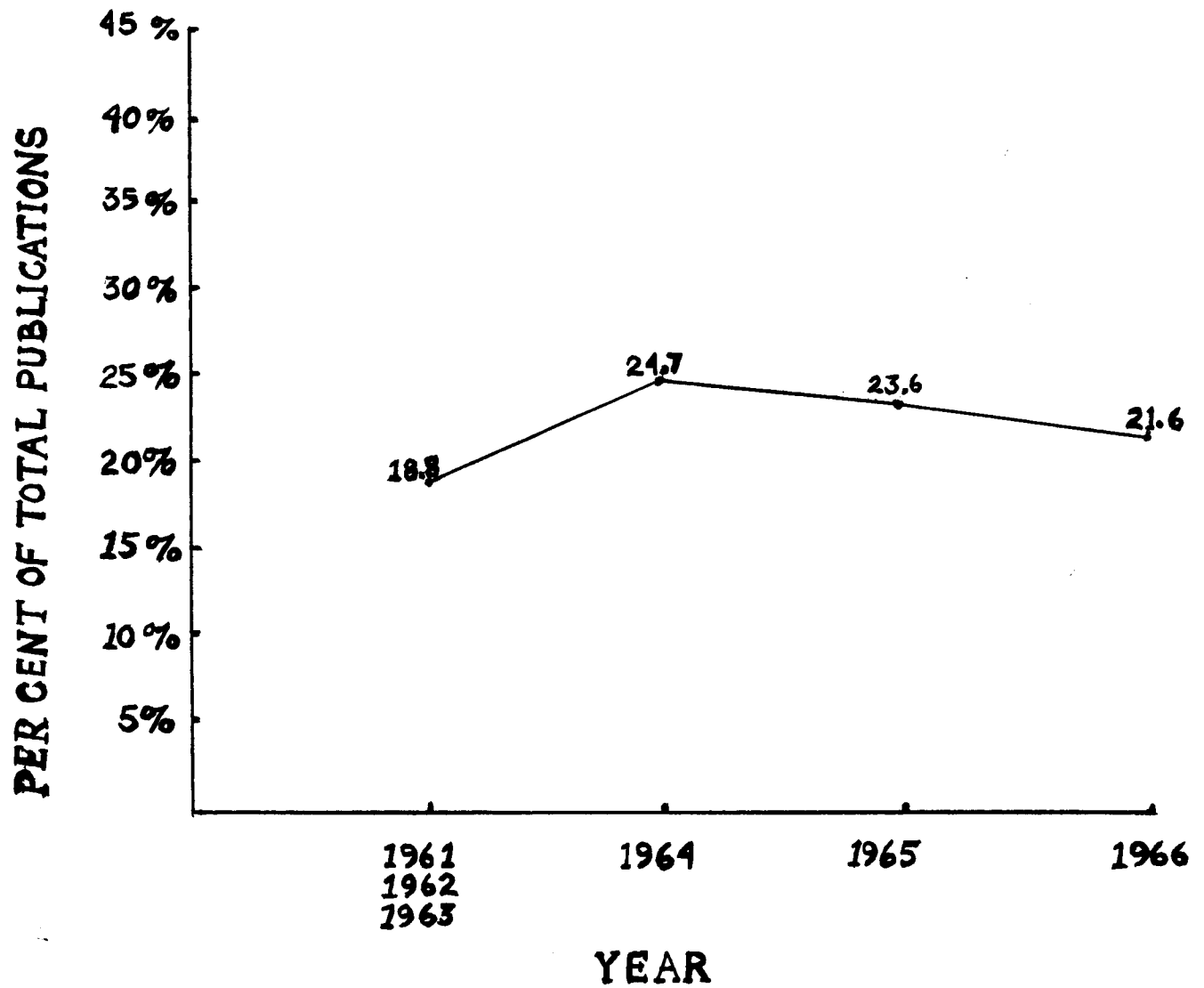


Figure 1. Neurophysiology

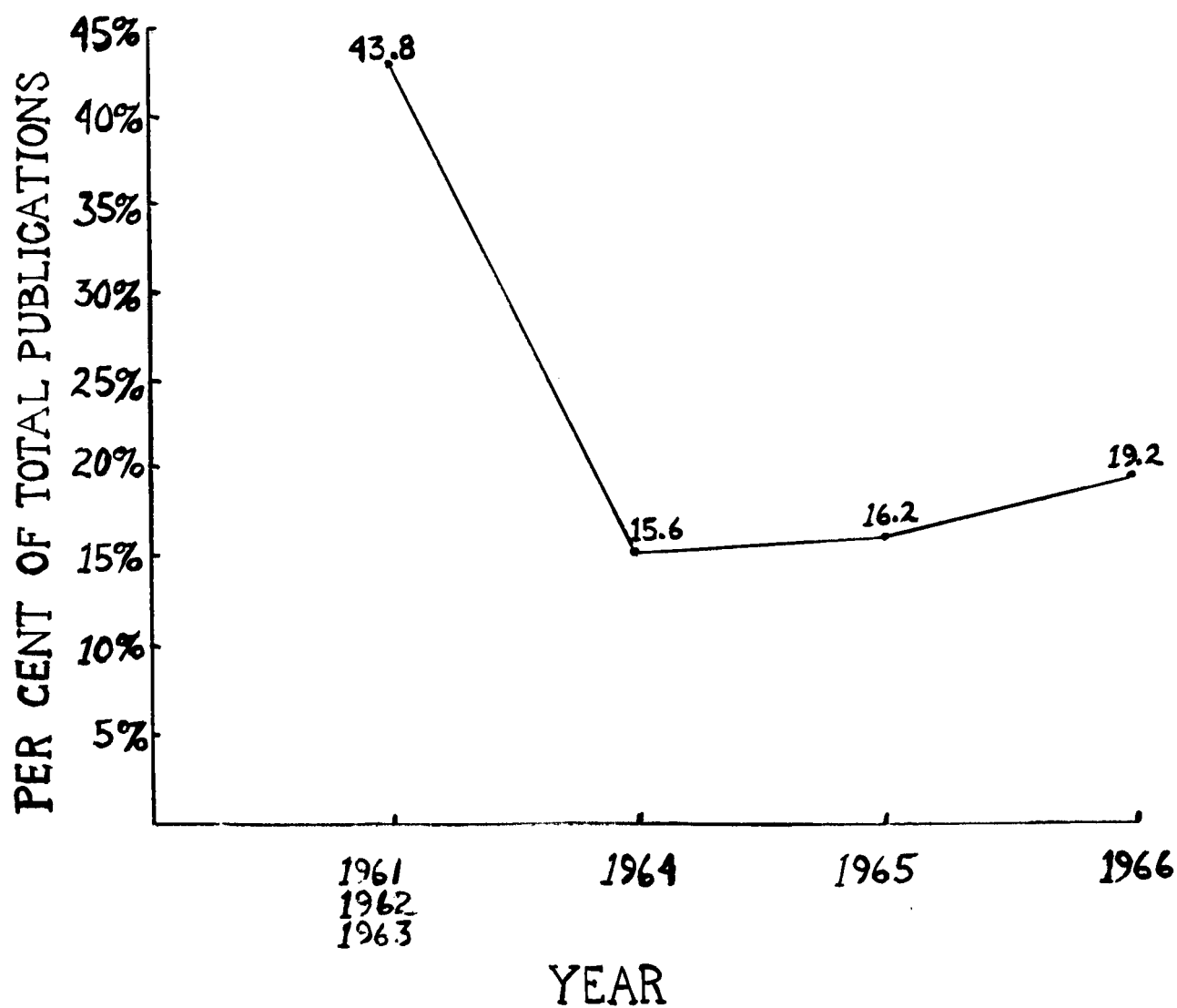


Figure 2. Psychology

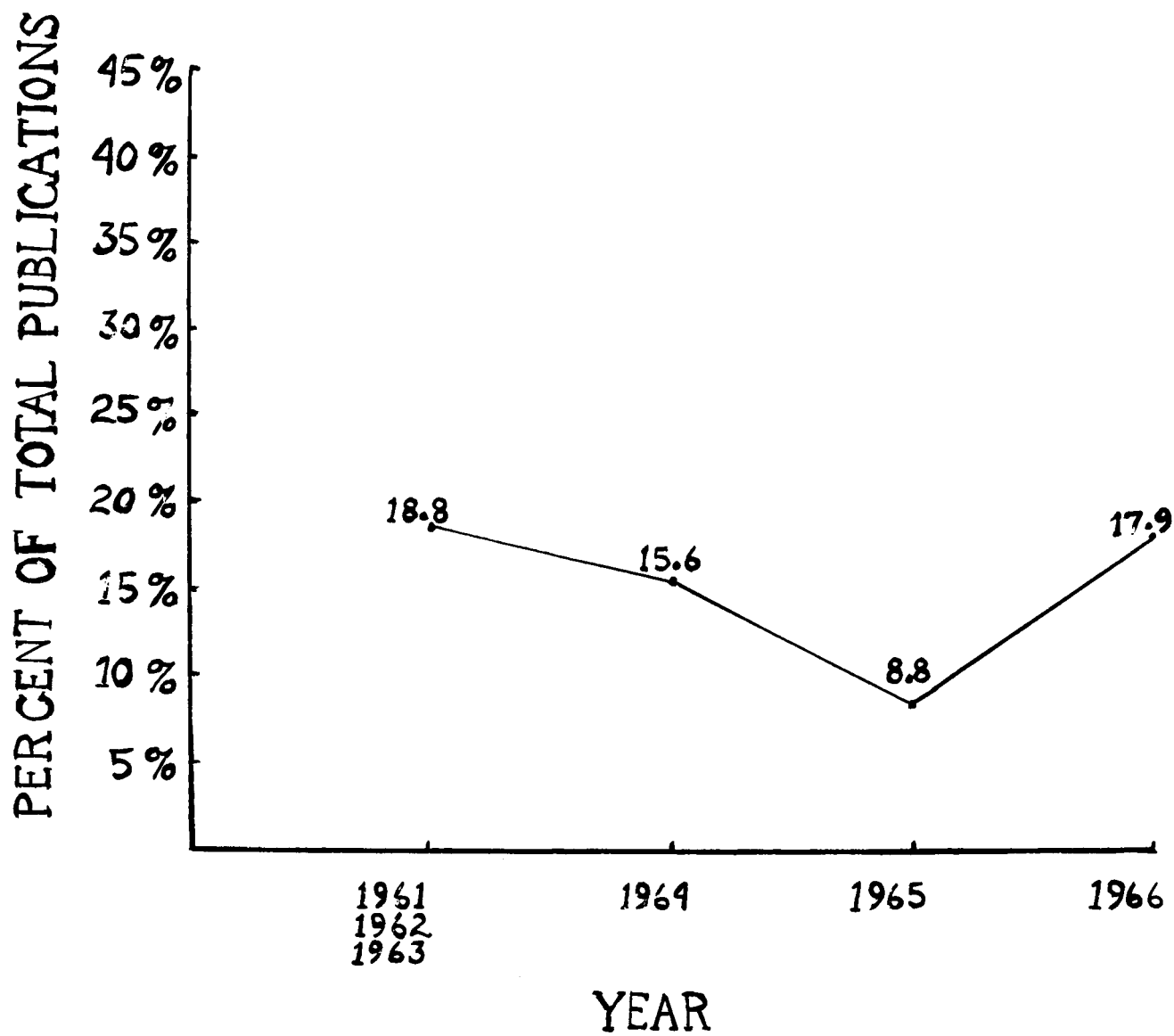


Figure 3. Psychophysiology

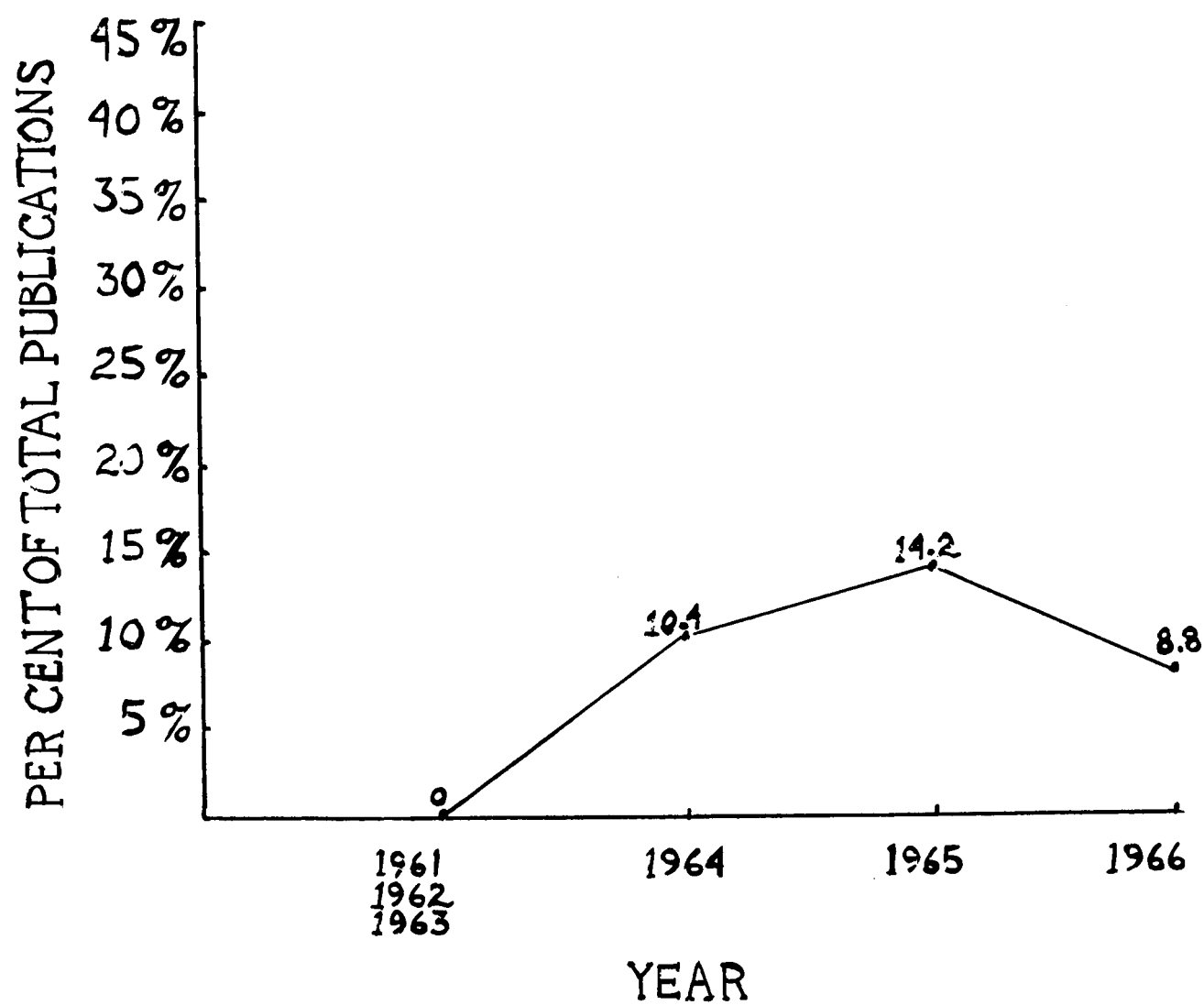


Figure 4. Engineering

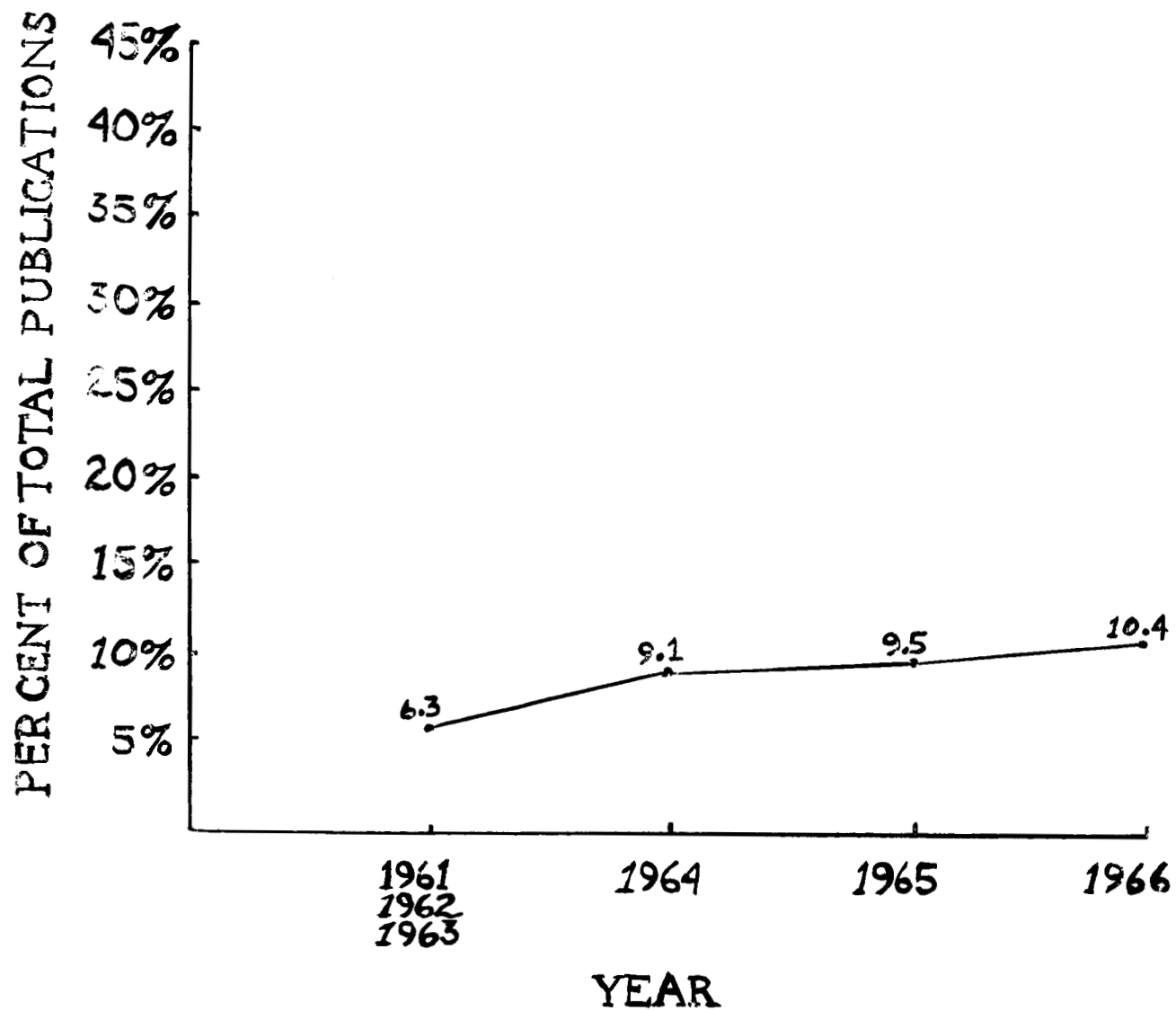


Figure 5. Physiology

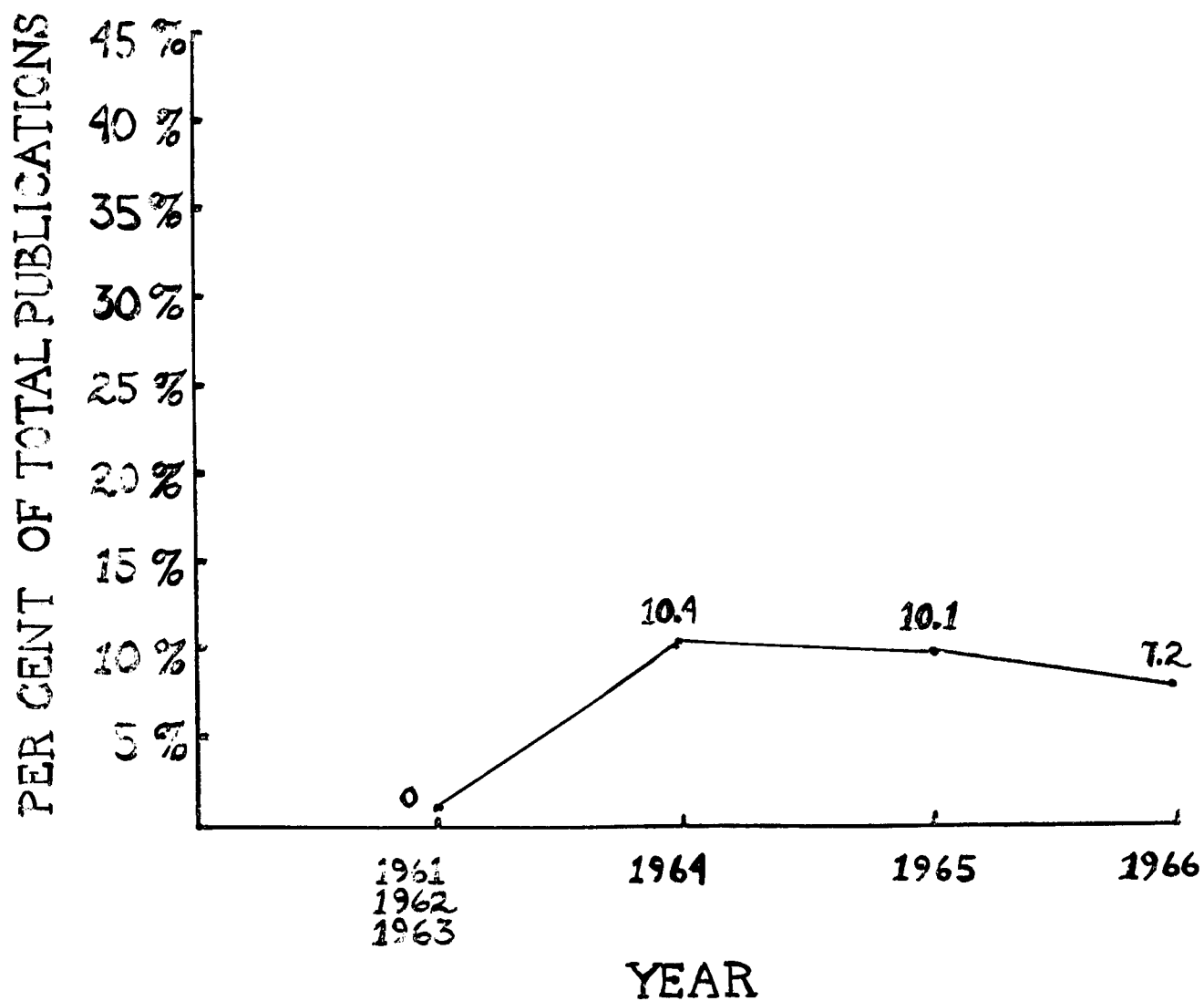


Figure 6. Linguistics and Psycholinguistics

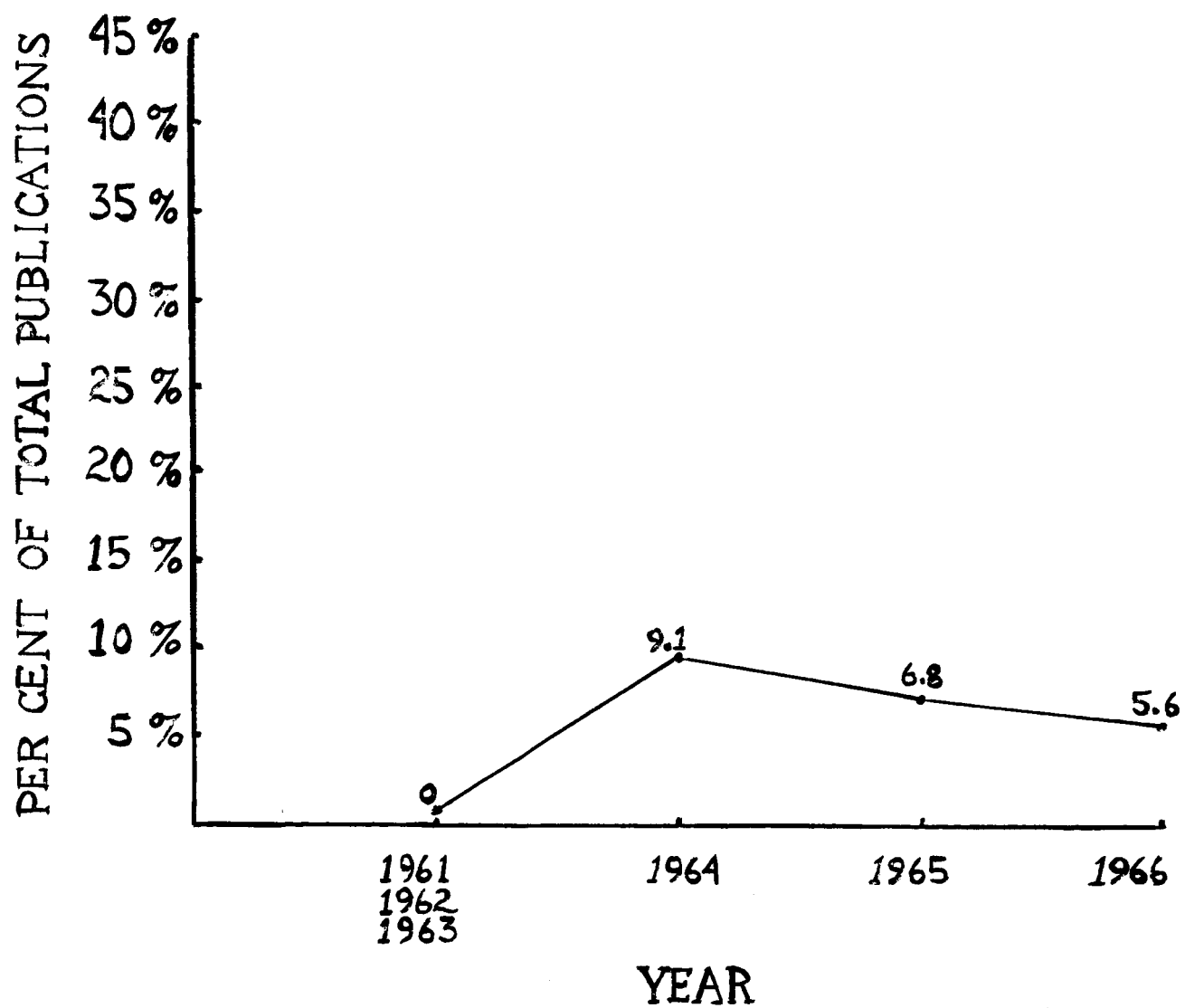


Figure 7. Circadian rhythms

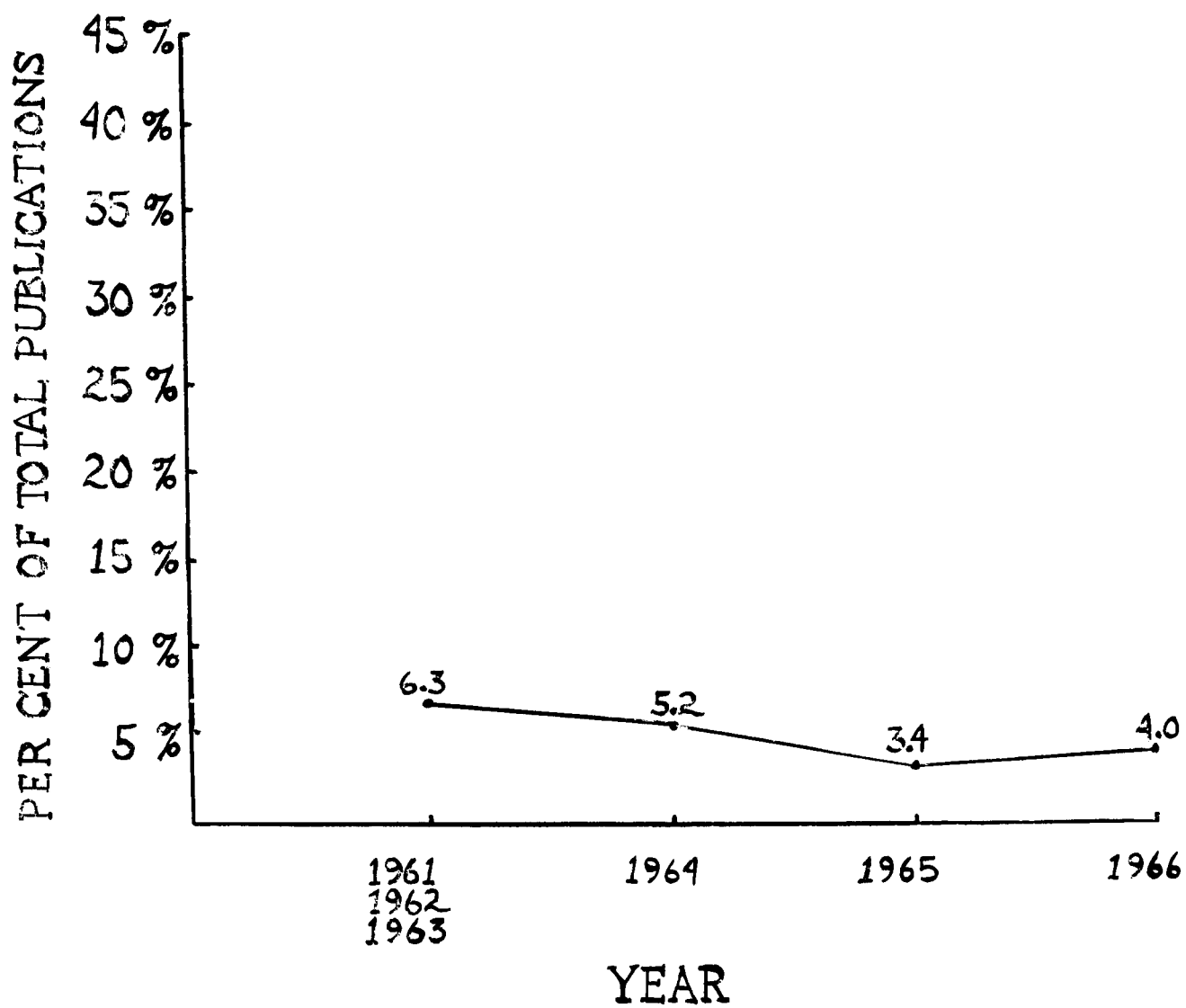


Figure 8. Information sciences

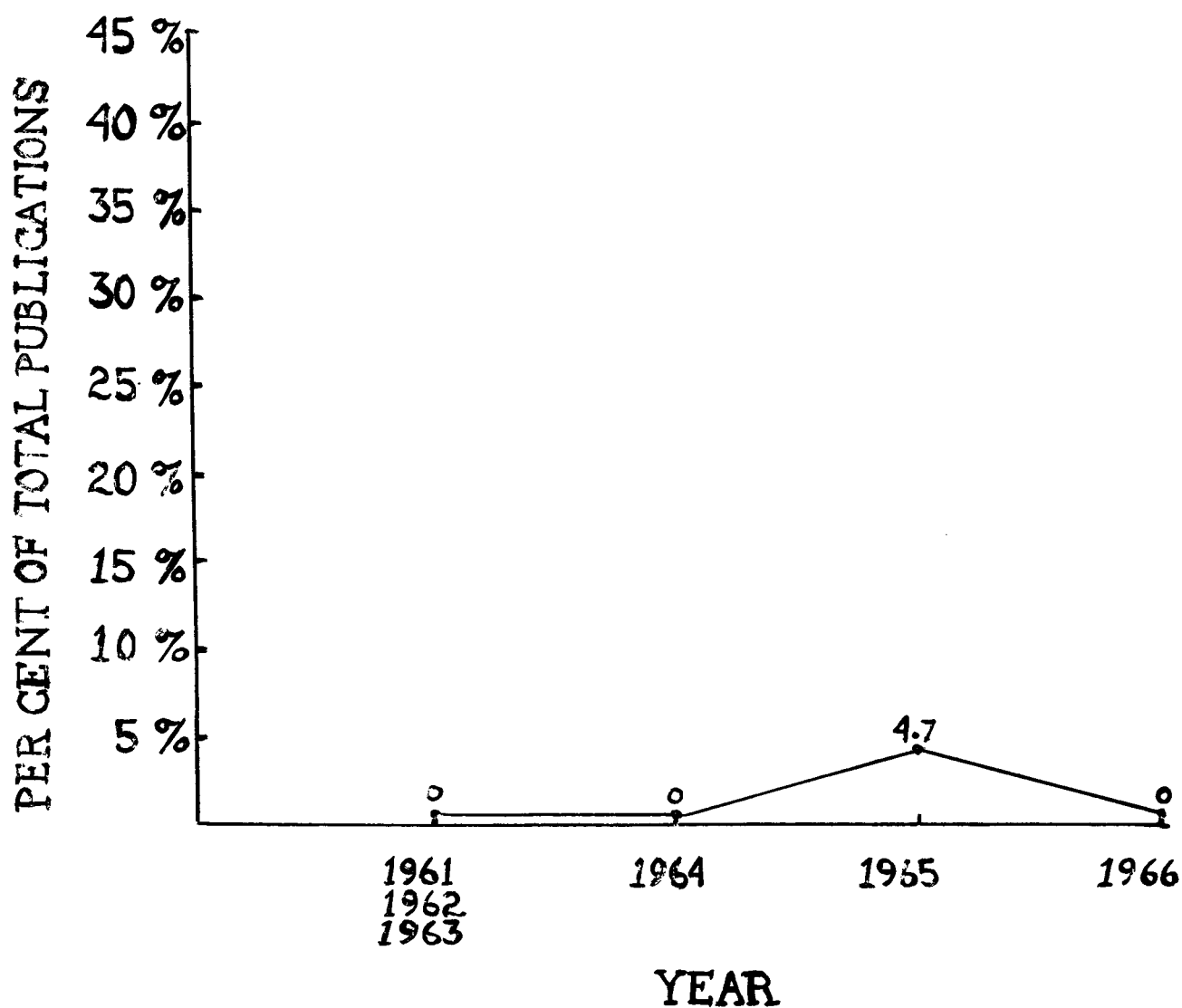


Figure 9. Medicine

Journals Publishing Behavioral Biology Articles

The following is an alphabetical list of journals in which some of the 428 articles appeared that resulted from research supported by the NASA Behavioral Biology Program.

The papers of this program branch were more widely distributed among the journals than those of the other offices. Of the 117 journals in which these publications appeared, more than 50% carried only one of these articles and more than 80% carried three or less. The "Journal of the Analysis of Experimental Behavior" carried the largest number of these articles (25) followed by "Science" which had 13. An analysis of the journals in which the serial citations of this program appeared is presented.

Acta Endocrinologica (1)
Acta Endocrinologica Supplementum (Copenhagen) (2)
Acta Oto-Laryngologica (2)
Aerospace Medicine (1)
American Journal of Physiology (1)
American Journal of Psychiatry (3)
American Journal of Psychology (3)
American Philosophical Quarterly (1)
American Surgeon (1)
Anatomical Record (2)
Anesthesiology (1)
Annals of the New York Academy of Sciences (5)
Annals of Otology, Rhinology and Laryngology (1)
Annual Review of Physiology (1)
Applied Optics (1)
Applied Physics Letters (1)
Archives of Environmental Health (2)
Archives Italiennes de Biologie (1)
ACM Communications (Association for Computing Machinery) (2)

Berichte der Bunsengesellschaft für physikalische Chemie (1)
Biophysical Journal (3)
Brain Research (4)
British Journal of Psychiatry (1)
British Journal of Urology (1)

Child Development (1)
Clinical Research (7)
Cold Spring Harbor Symposia on Quantitative Biology (1)
Comptes Rendus Academie des Sciences Paris (2)

Electroencephalography and Clinical Neurophysiology (6)
Electroencephalography and Clinical Neurophysiology,
Supplement (1)
Electronic Letters (1)
Endocrinology (1)
Experientia (2)
Experimental Brain Research (2)
Experimental Neurology (6)

Federation Proceedings (6)

Harvard Education Review (1)

Information and Control (4)

ICC Bulletin (International Computation Centre) (1)

IEEE International Convention Record (4)

IEEE Proceedings (Institute of Electrical and Electronics Engineers, Inc.) (5)

IEEE Spectrum (1)

IEEE Student Journal (1)

IEEE Transactions on Bio-Medical Electronics (Institute of Electrical and Electronics Engineers, Inc.) (1)

IEEE Transactions on Circuit Theory (1)

IEEE Transactions on Communications Systems (1)

IEEE Transactions on Communication (COM) (Institute of Electrical and Electronics Engineers, Inc.) (3)

IEEE Transactions on Computer (Institute of Electrical and Electronics Engineers, Inc.) (1)

IEEE Transactions on Electronic Computers (1)

IEEE Transactions on Information Theory (Institute of Electrical and Electronics Engineers, Inc.) (7)

International Journal of American Linguistics (1)

International Journal of Biometeorology (1)

International Journal of Control (3)

Investigative Urology (3)

Journal of the Acoustical Society of America (9)

Journal of American Physical Therapy Association (2)

Journal of Applied Physiology (1)

Journal of Comparative Neurology (2)

Journal of Comparative and Physiological Psychology (11)

Journal of Engineering Psychology (1)

Journal of Experimental Analysis of Behavior (25)

Journal of Experimental Psychology (5)

Journal of the Franklin Institute (1)

Journal of Gerontology (1)

Journal of Linguistics (1)

Journal of Mathematical Psychology (1)

Journal of the National Cancer Institute (1)

Journal of Neurophysiology (3)

Journal of the Optical Society of America (1)

Journal of Perceptive Psychophysiology (2)

Journal of Pharmacology and Experimental Therapeutics (1)

Journal of Philosophy (2)

Journal of Physiology (2)

Journal of Psychology (1)

Journal of Psychosomatic Research (1)

Journal of Speech and Hearing Research (2)

Journal of Theoretical Biology (1)

Journal of Urology (6)

Journal of Vacuum Science and Technology (1)

Journal of Verbal Learning and Verbal Behavior (4)

Kybernetik (2)

Language (1)
Language and Speech (1)
Life Sciences (3)

Modern Language Journal (1)

Nature (6)
Die Naturwissenschaften (1)
Neurology (1)
Neuropsychologia (6)
New Scientist (1)
Nursing Research (1)

Pediatrics (1)
Perceptual and Motor Skills (3)
The Pharmacologist (1)
Physics Today (1)
The Physiologist (6)
Planta (Berlin) (1)
Presse Medicale (1)
Proceedings of the Institution of Electrical Engineers
(London) (1)
Proceedings of the National Academy of Sciences (2)
Proceedings of the National Electronics Conference (2)
Proceedings of the Society for Experimental Biology and
Medicine (1)
Psychological Record (1)
Psychological Review (2)
Psychonomic Science (12)
Psychosomatic Medicine (1)

Quarterly Journal of Experimental Psychology (2)

Science (13)
Scientia (1)
Scientific American (2)
Surgical Forum (2)

Today (1)
Transactions of the New York Academy of Sciences (1)

Urologia Internationalis (1)

Vision Research (1)

Zeitschrift fur Pflanzenphysiologie (1)

Addendum

1961

- A1. BURES, J., BURESOVA, O., FIFKOVA, E., OLDS, M. E., and TRAVIS, R. P. Spreading depression and subcortical drive centers. *Physiol. Bohemoslov.* 10:321-331. 1961.

1962

- A2. OLDS, J. Hypothalamic substrates of reward. *Physiol. Ref.* 42(4): 554-604. Oct. 1962.
- A3. OLDS, J. Mechanisms of instrumental conditioning. (Abstr.) *EEG* 14:426-427. 1962.
- A4. OLDS, J. Spreading depression and hypothalamic behavior mechanisms. *Fed. Proc.* 21(3):648-658. 1962.

1963

- *A5. OLDS, J. Mechanisms of instrumental conditioning. *EEG Suppl.* 24. 1963.

1964

- A6. BRIESE, E., and OLDS, J. Reinforcing brain stimulation and memory in monkeys. *Exp. Neurol.* 10(6):296-304. Dec. 1964.
- A7. OLDS, M. E., and HOGBERG, D. Subcortical lesions and maze retention in the rats. *Exp. Neurol.* 10(4):296-304. Oct. 1964.
- A8. OLDS, J., and OLDS, M. E. The mechanisms of voluntary behavior. In R. E. Heath, ed. *The Role of Pleasure in Behavior*, p. 23-53. New York, Hoeber Medical Division, Harper and Row, 1964.

Errata Sheet

The following citations should be corrected to read:

418. EARLY, L. J., ed. Development of a small animal payload and integration with a sounding rocket. 1966.

#669 in VOLUME II ENVIRONMENTAL BIOLOGY should be cited in VOLUME I as follows:

- 262.1.FRENCH, J. D., ADEY, W. R., and WALTER, D. O. Computer analysis of EEG data for a normative library. Final report to the National Aeronautics and Space Administration on Research Contract NAS 9-170, Sept. 23, 1963 to Jan. 31, 1966. Apr. 15, 1966.